

FIG. 1

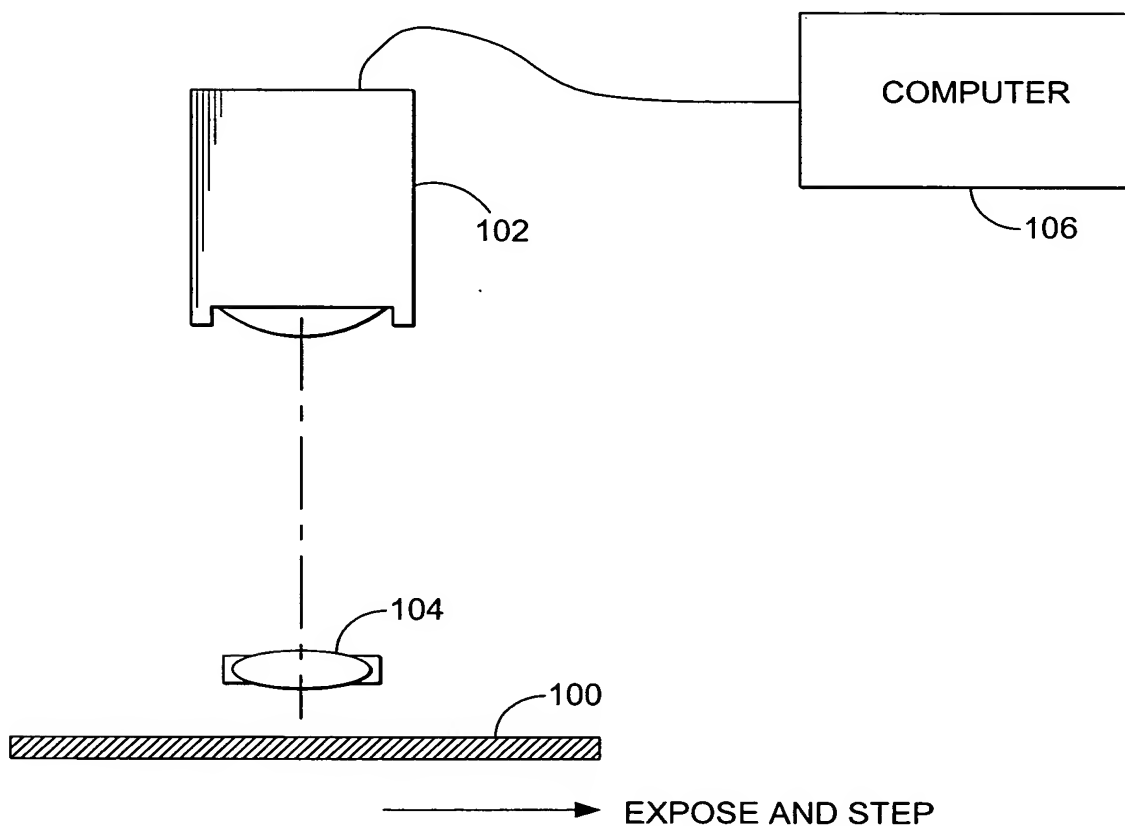


FIG. 4

FIG. 2

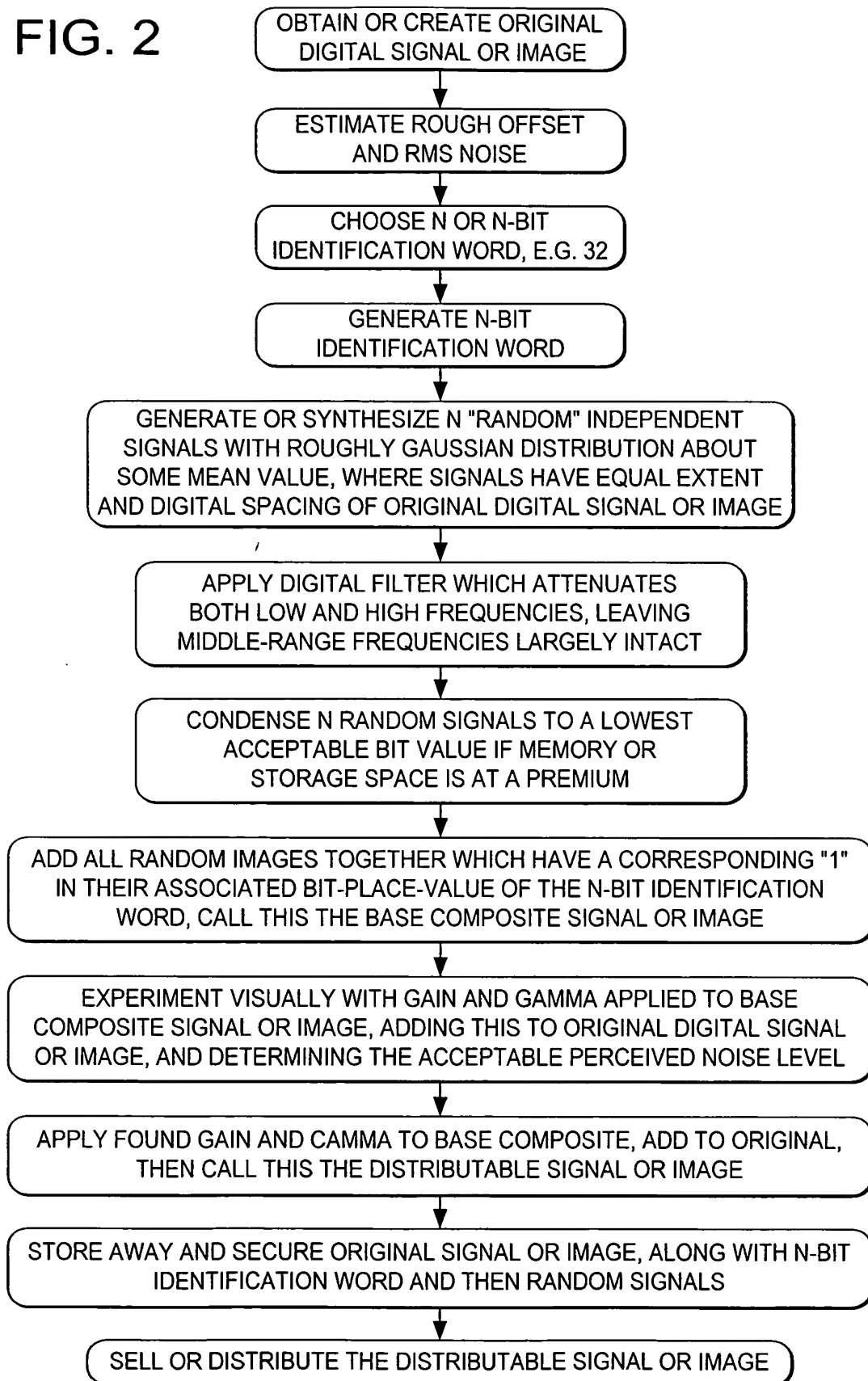
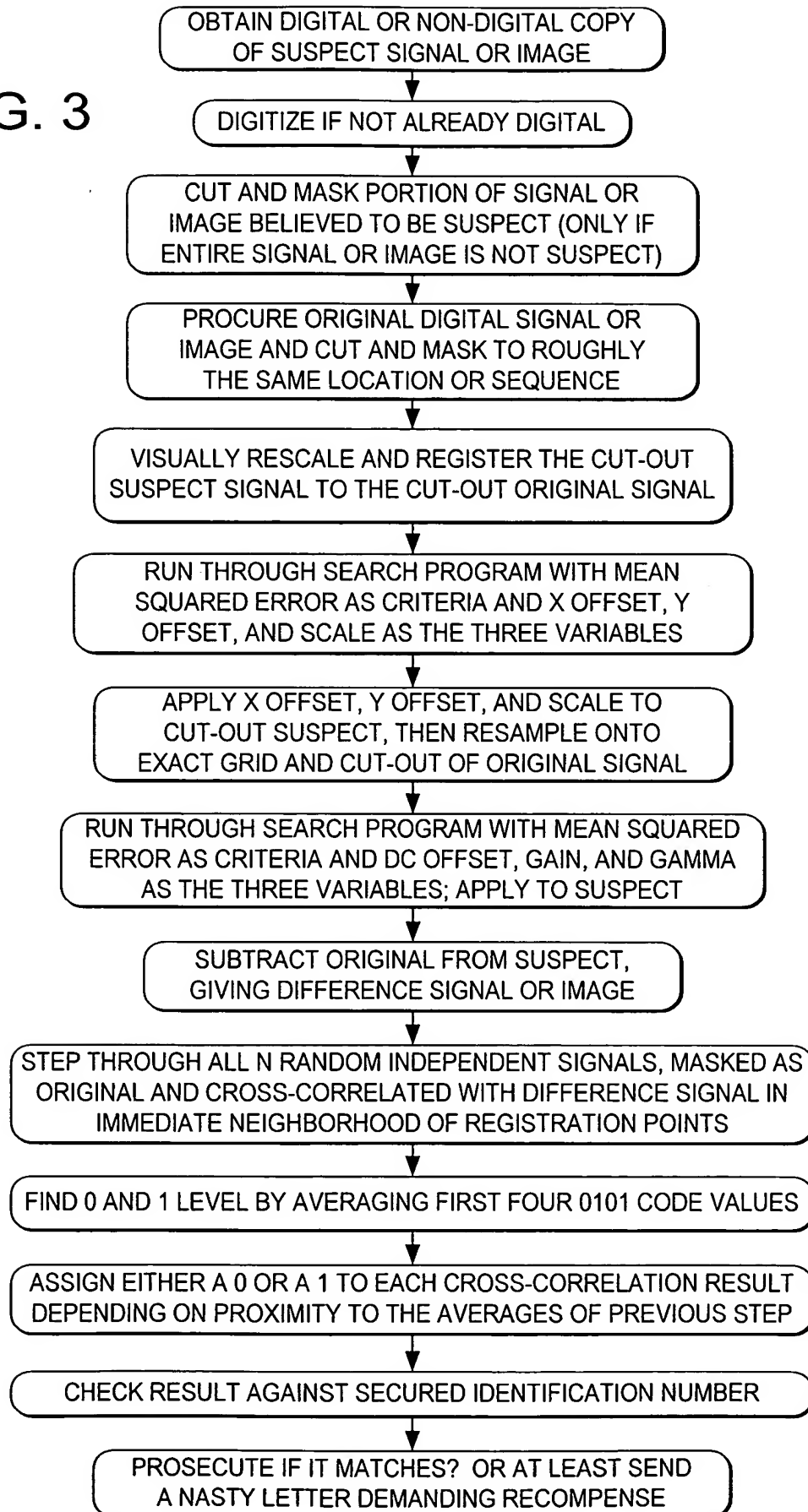


FIG. 3





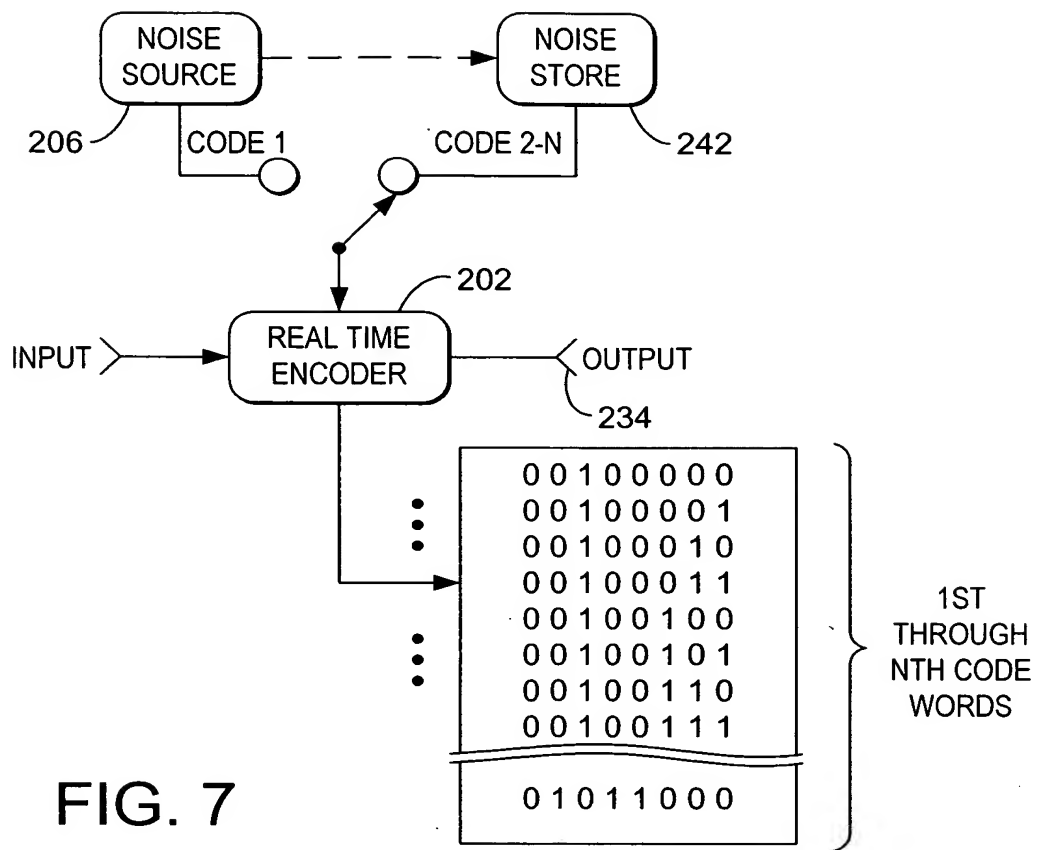


FIG. 7

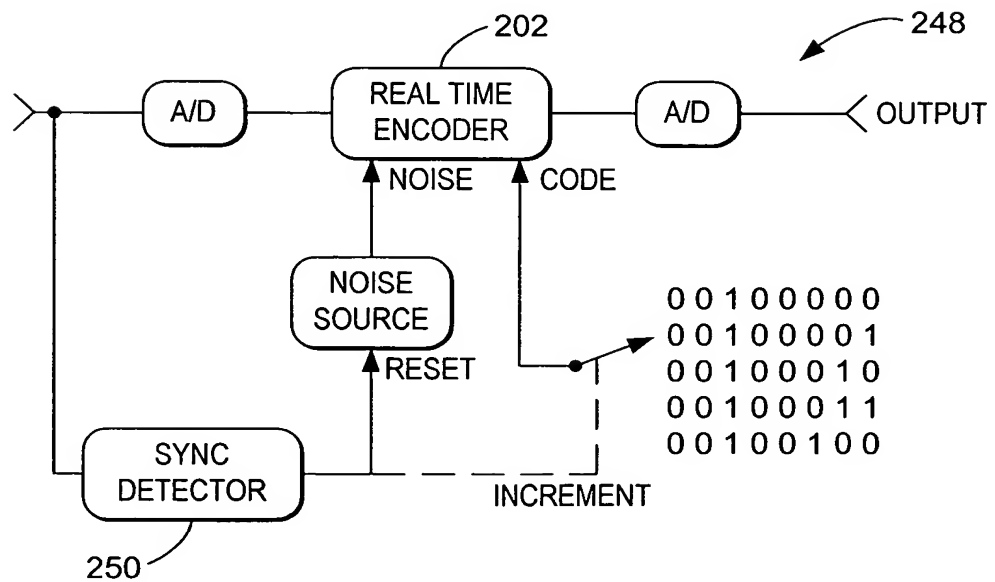
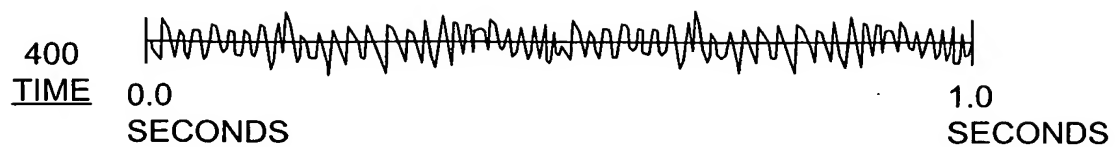
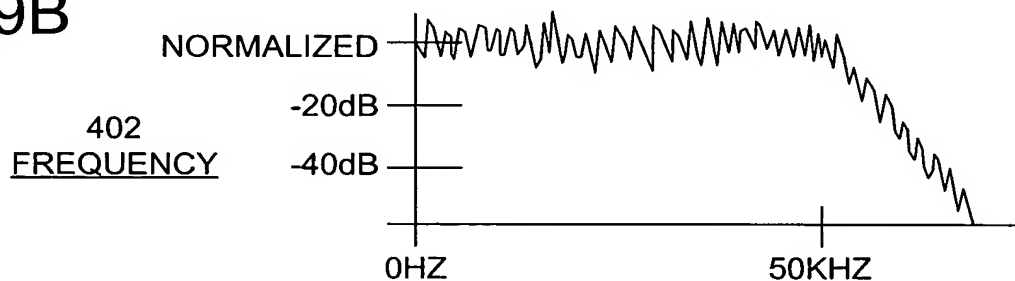


FIG. 8

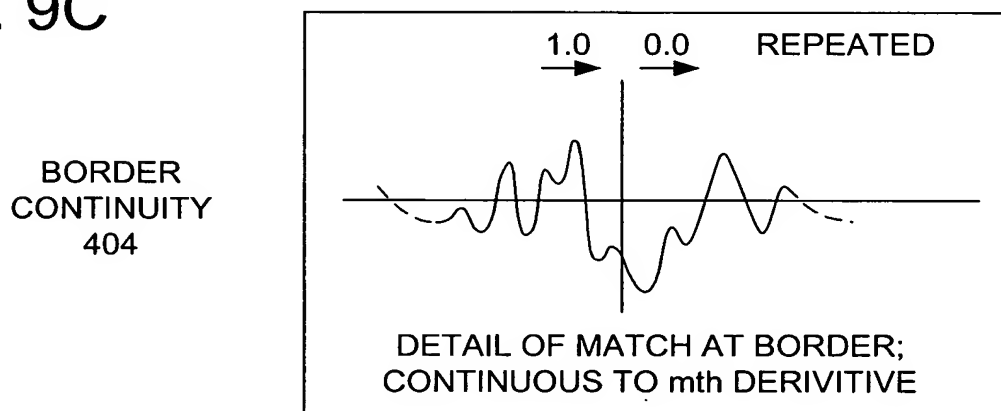
# FIG. 9A



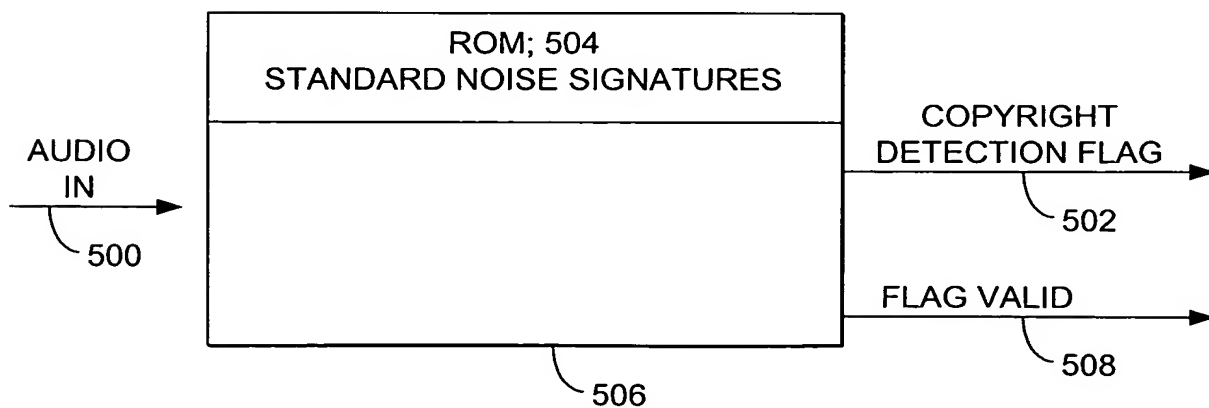
# FIG. 9B



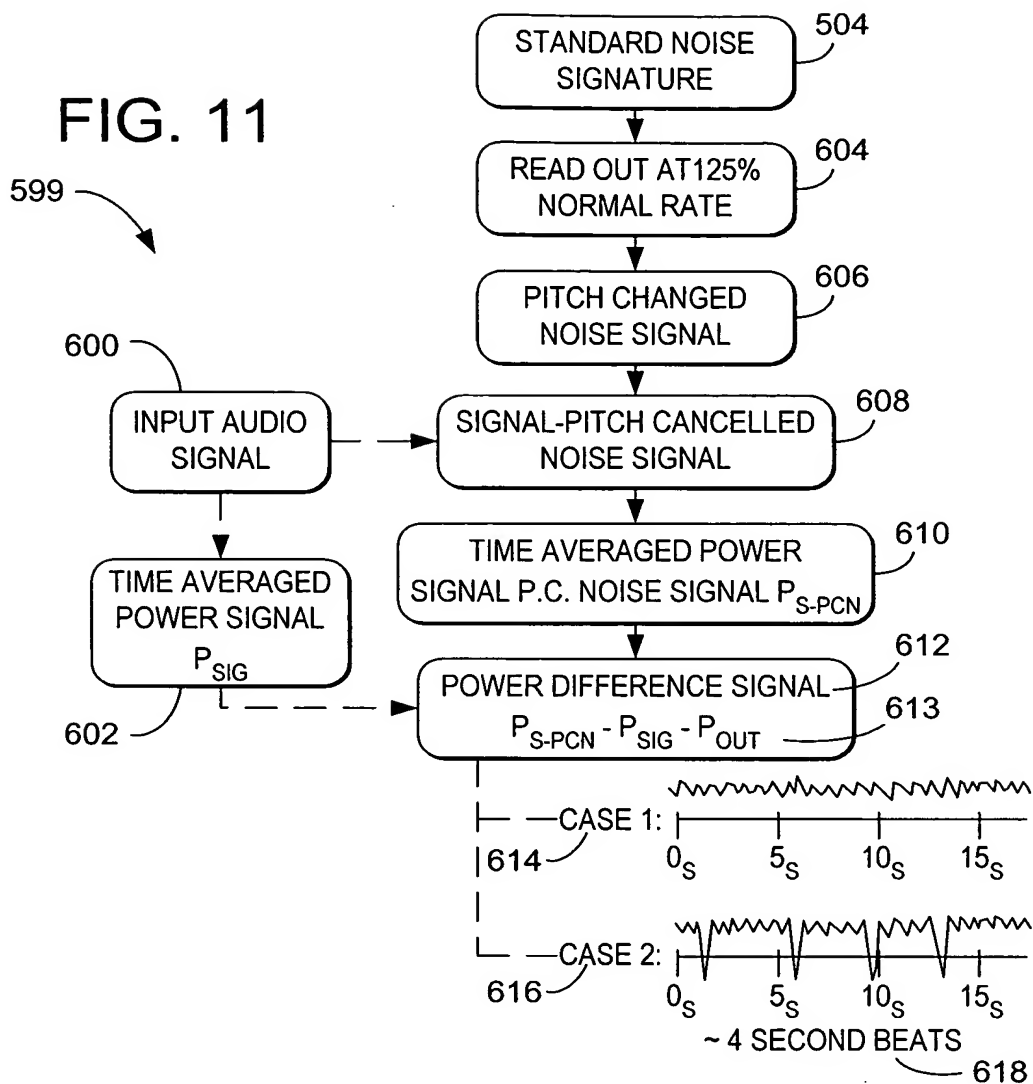
# FIG. 9C



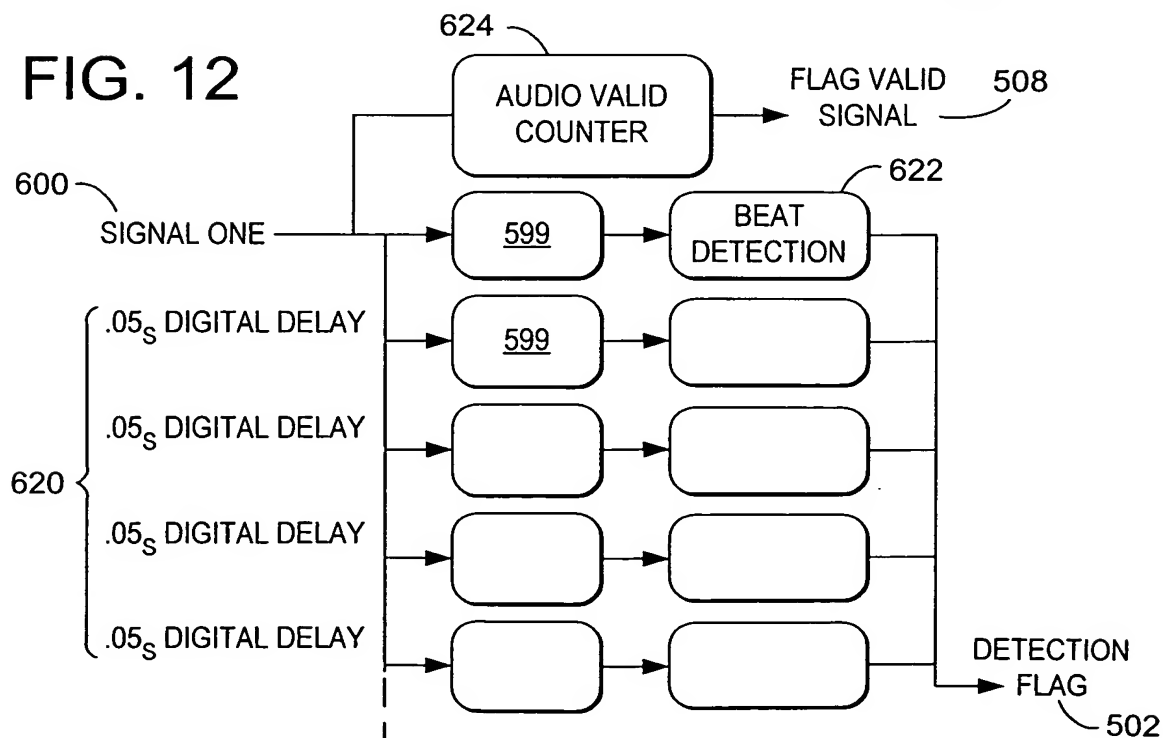
# FIG. 10

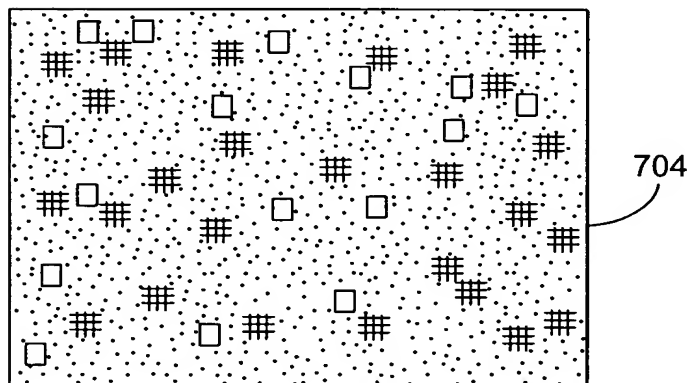
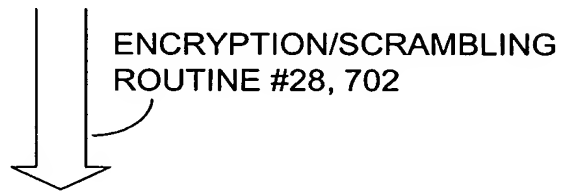
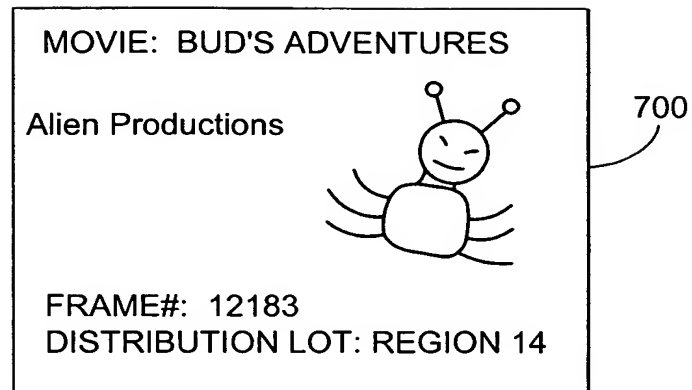


# FIG. 11



# FIG. 12





PSEUDO-RANDOM MASTER SNOWY IMAGE  
(SCALED DOWN AND ADDED TO FRAME 12183)

FIG. 13



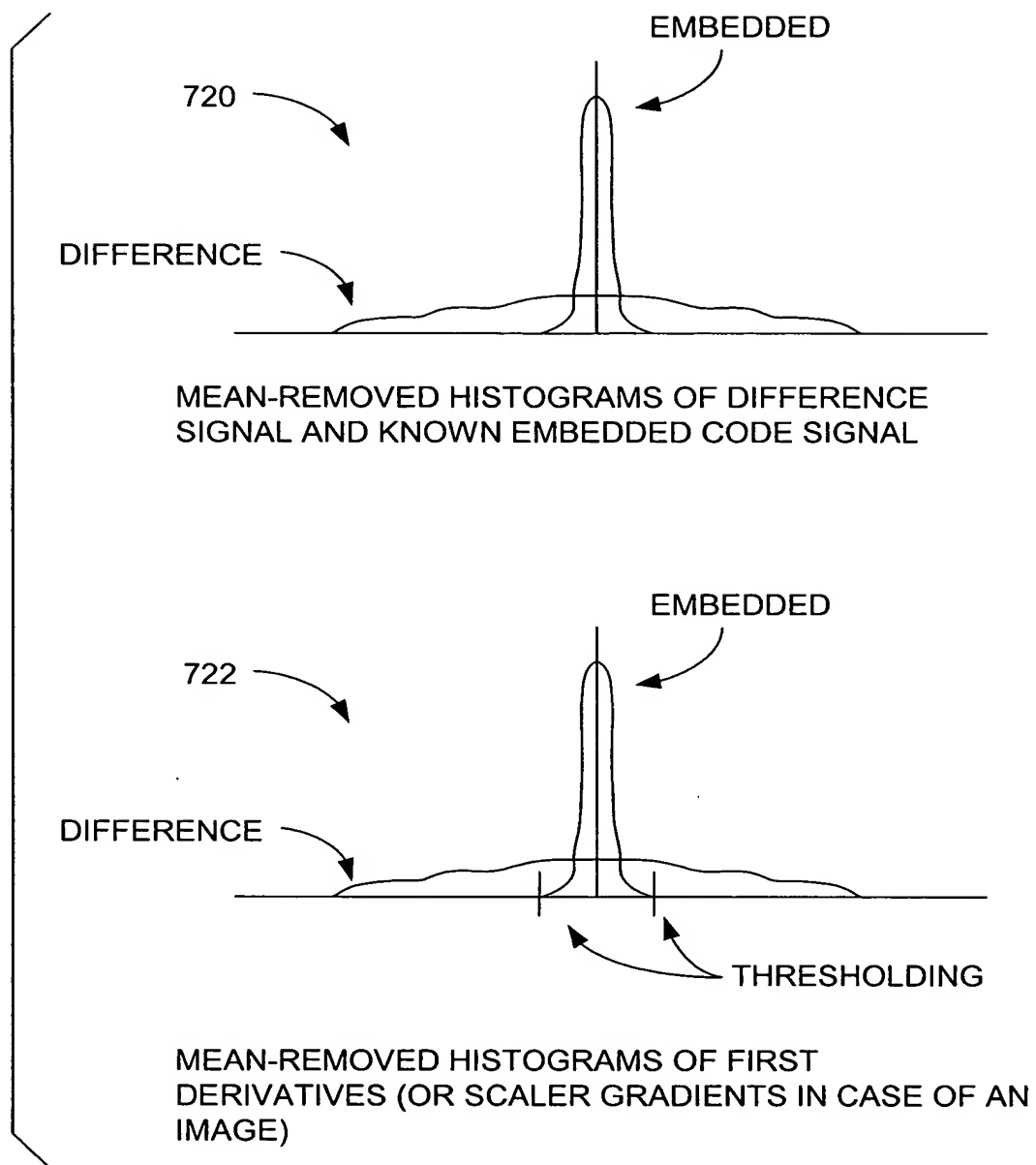


FIG. 14

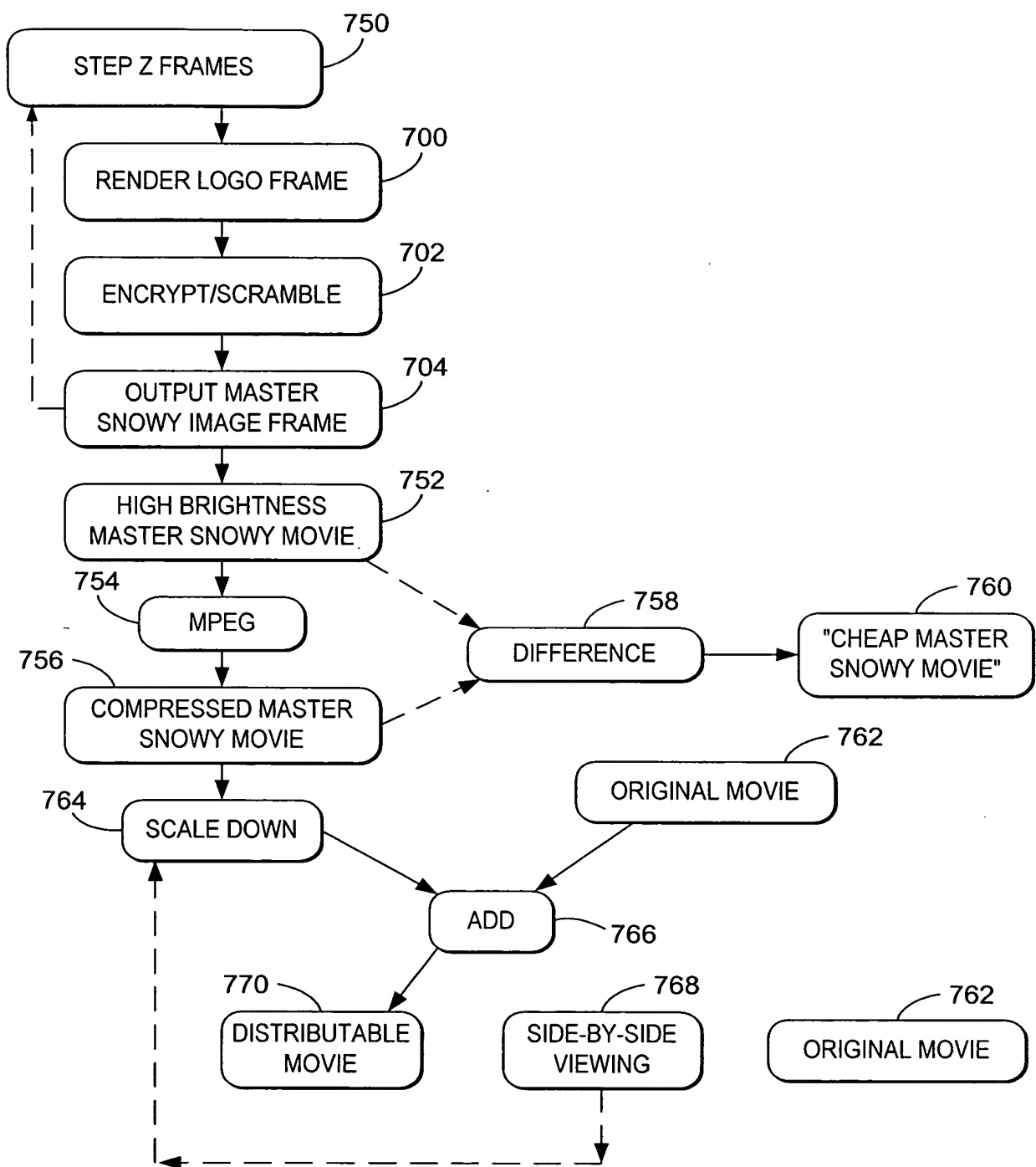


FIG. 15

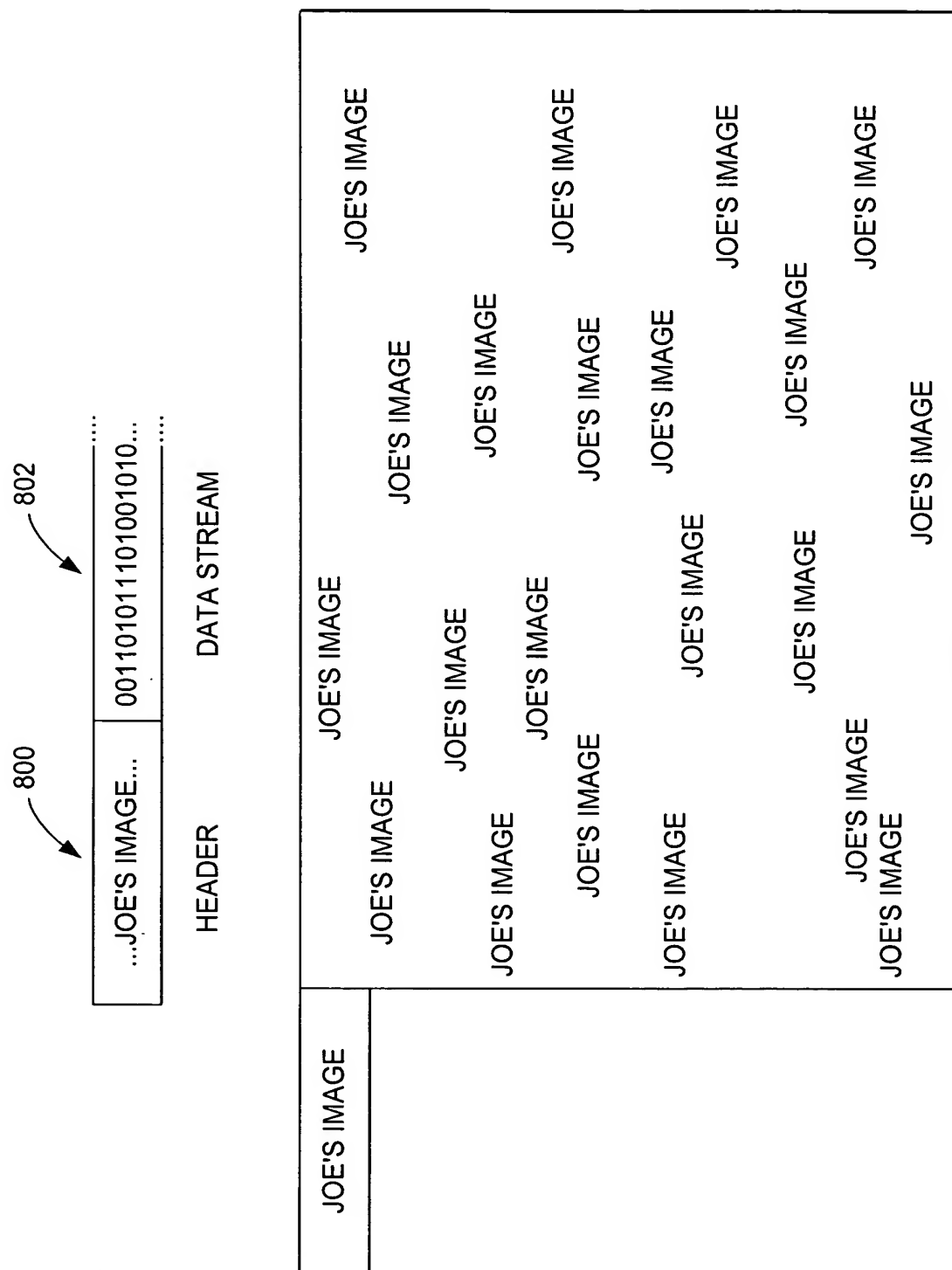


FIG. 16

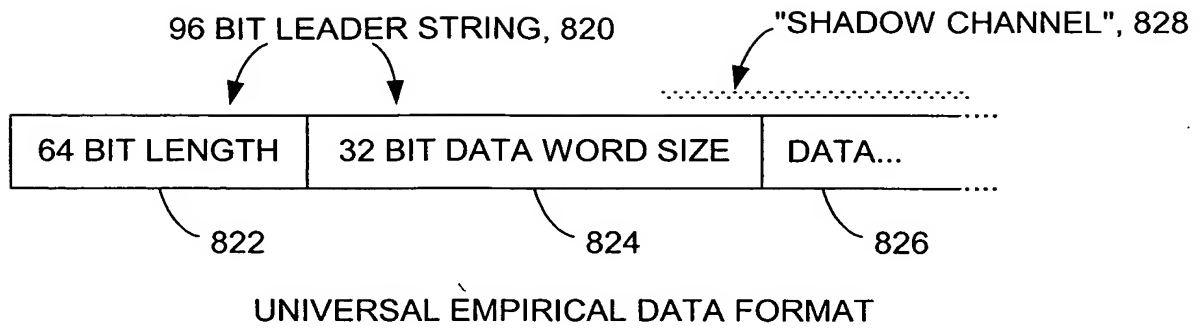


FIG. 17

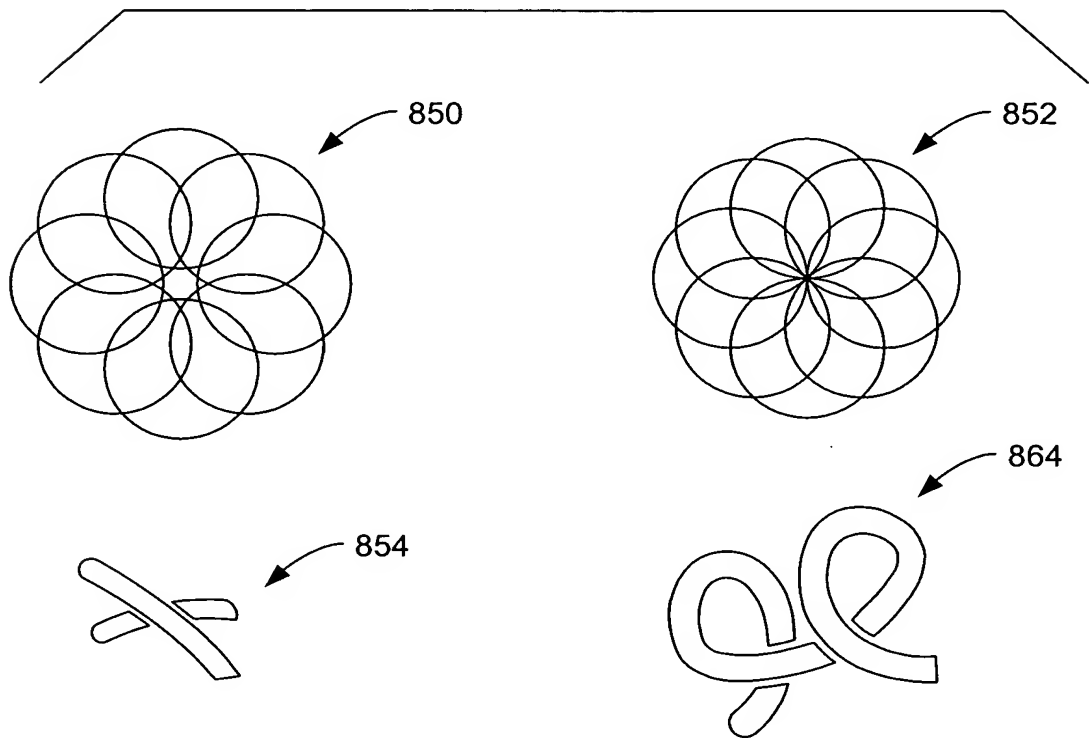
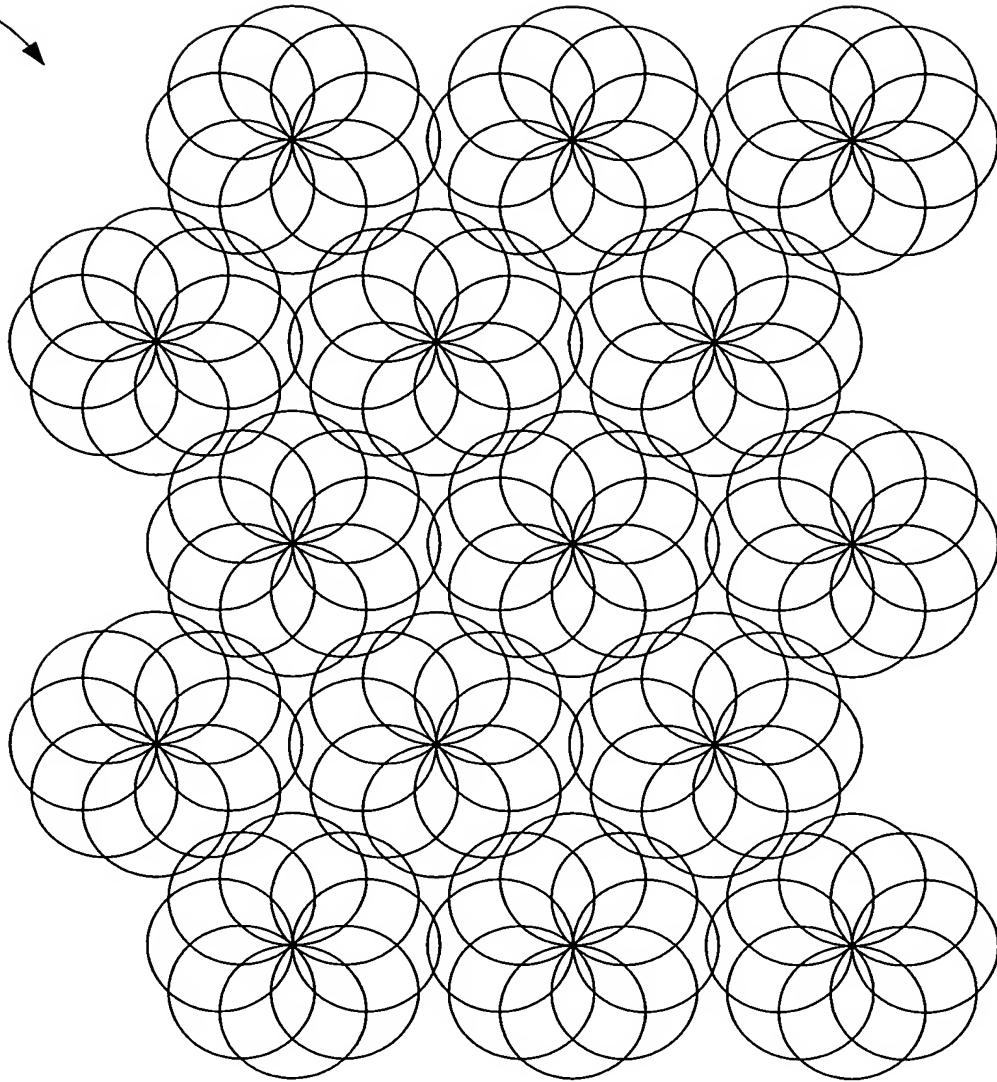


FIG. 18

866



QUEST FOR MOSAICED KNOT PATTERNS WHICH "COVER" AND  
ARE COEXTENSIVE WITH ORIGINAL IMAGE; ALL ELEMENTAL  
KNOT PATTERNS CAN CONVEY THE SAME INFORMATION, SUCH  
AS A SIGNATURE, OR EACH CAN CONVEY A NEW MESSAGE IN A  
STEGANOGRAPHIC SENSE

FIG. 19

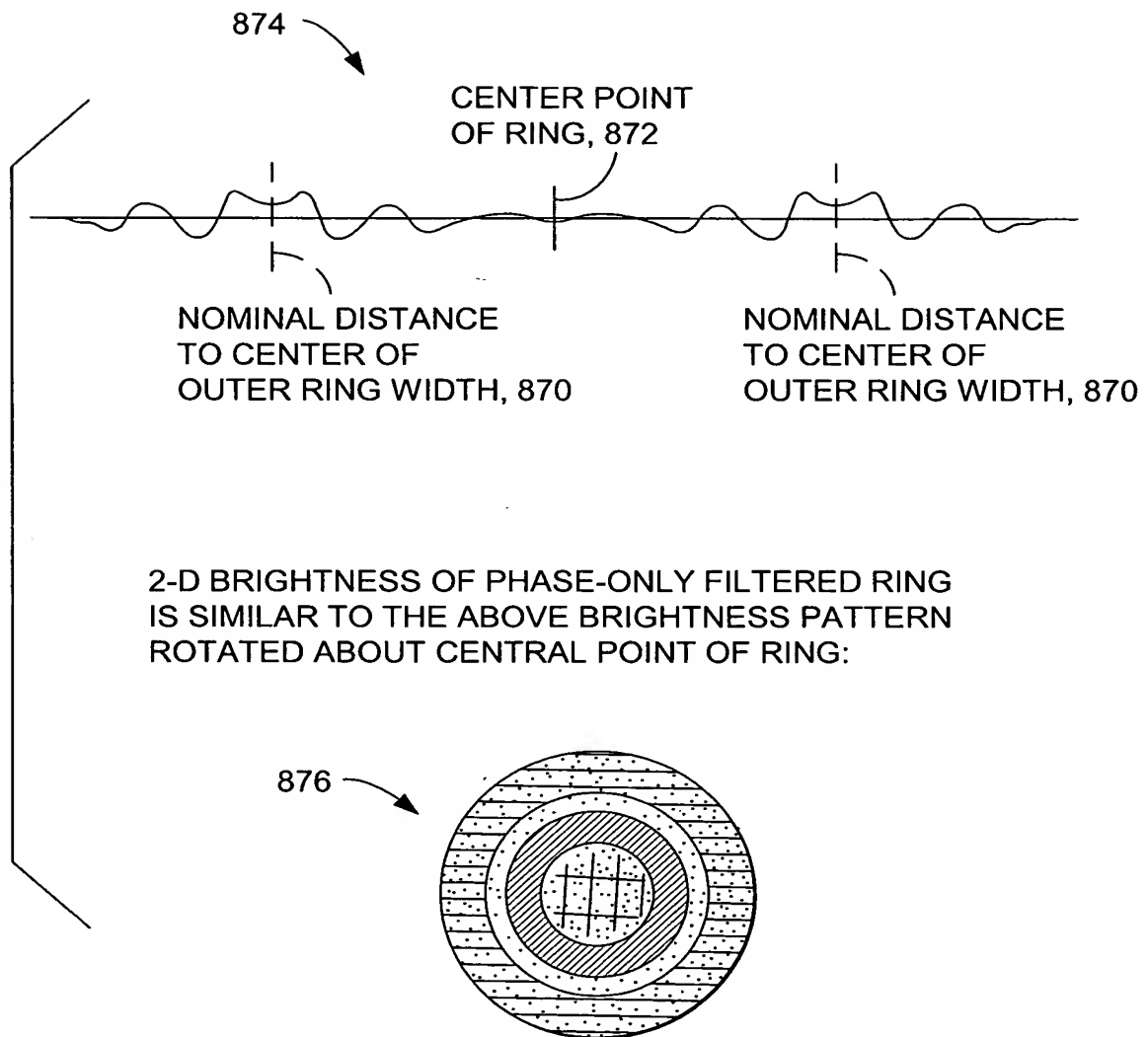


FIG. 20

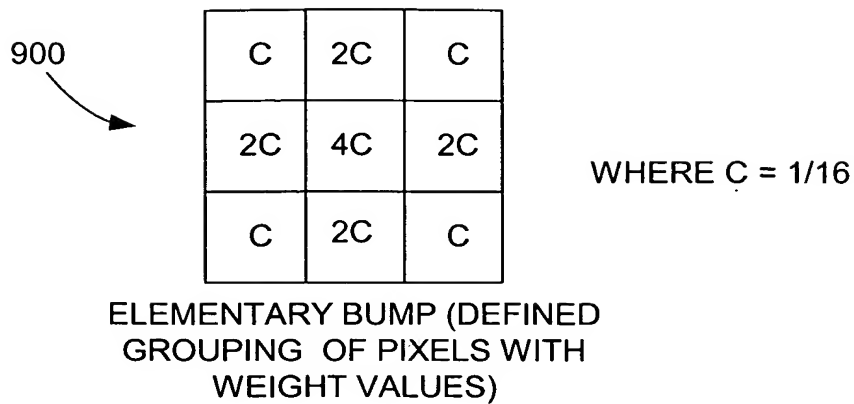
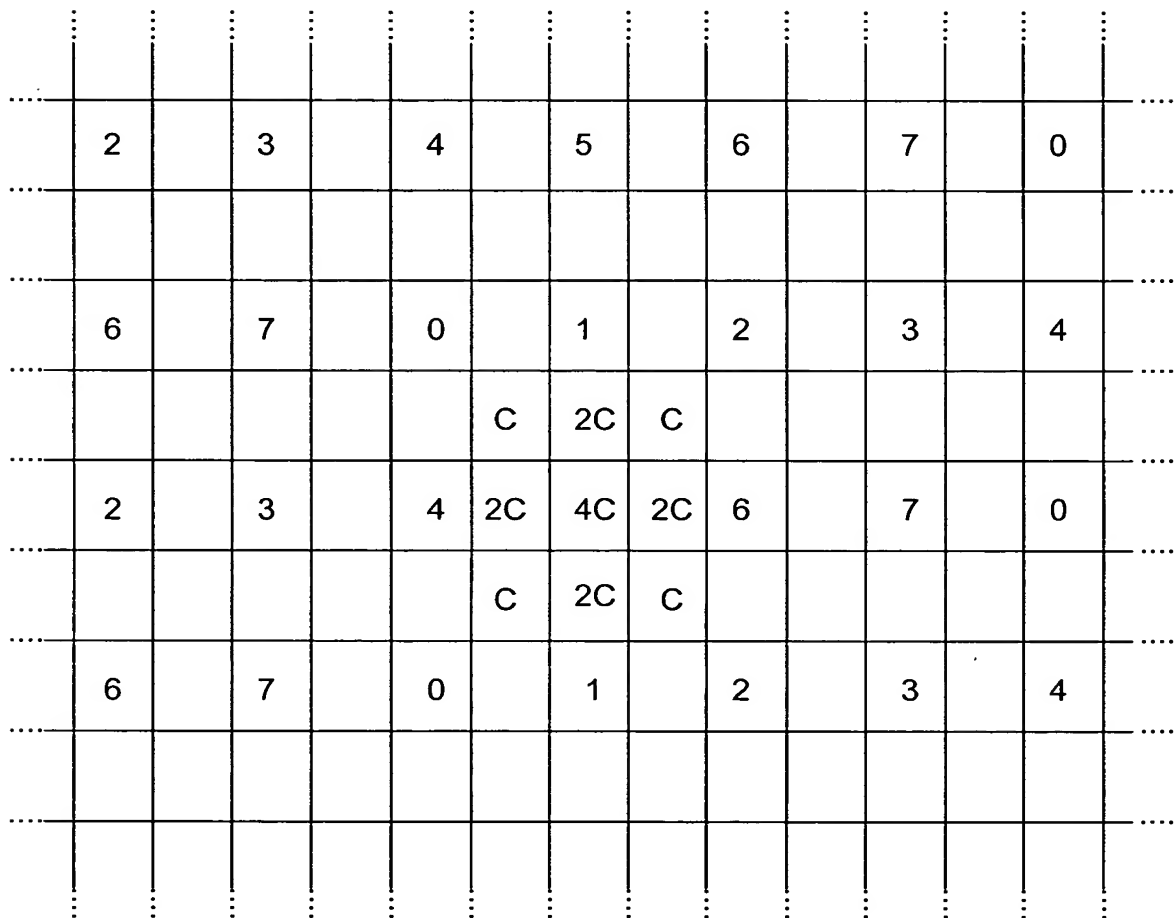


FIG. 21A



EXAMPLE OF HOW MANY ELEMENTARY BUMPS, 900, WOULD BE ASSIGNED LOCATIONS IN AN IMAGE, AND THOSE LOCATIONS WOULD BE ASSOCIATED WITH A CORRESPONDING BIT PLANE IN THE N-BIT WORD, HERE TAKEN AS  $N=8$  WITH INDEXES OF 0-7. ONE LOCATION, ASSOCIATED WITH BIT PLANE "5", HAS THE OVERLAY OF THE BUMP PROFILE DEPICTED.

FIG. 21B

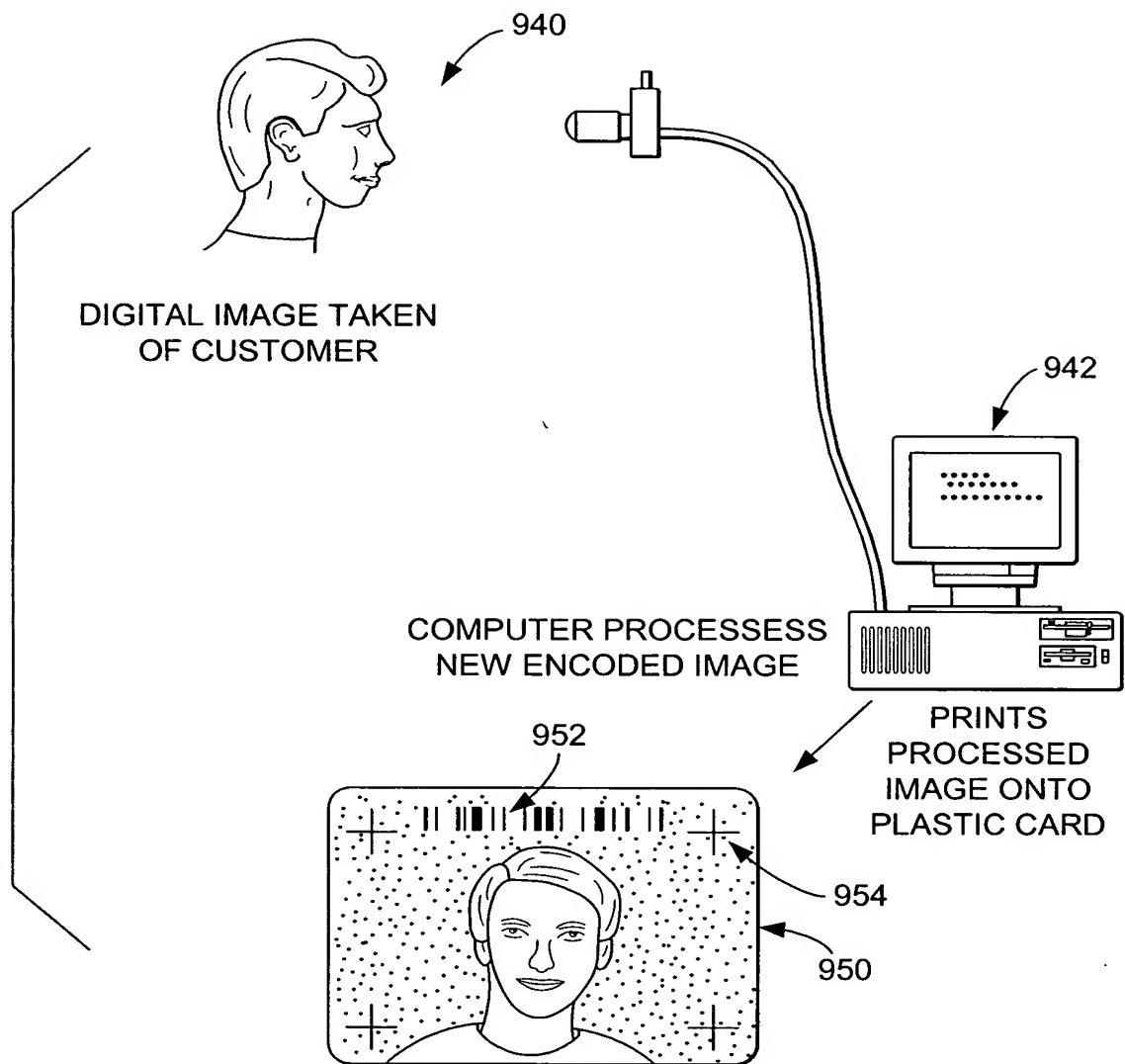
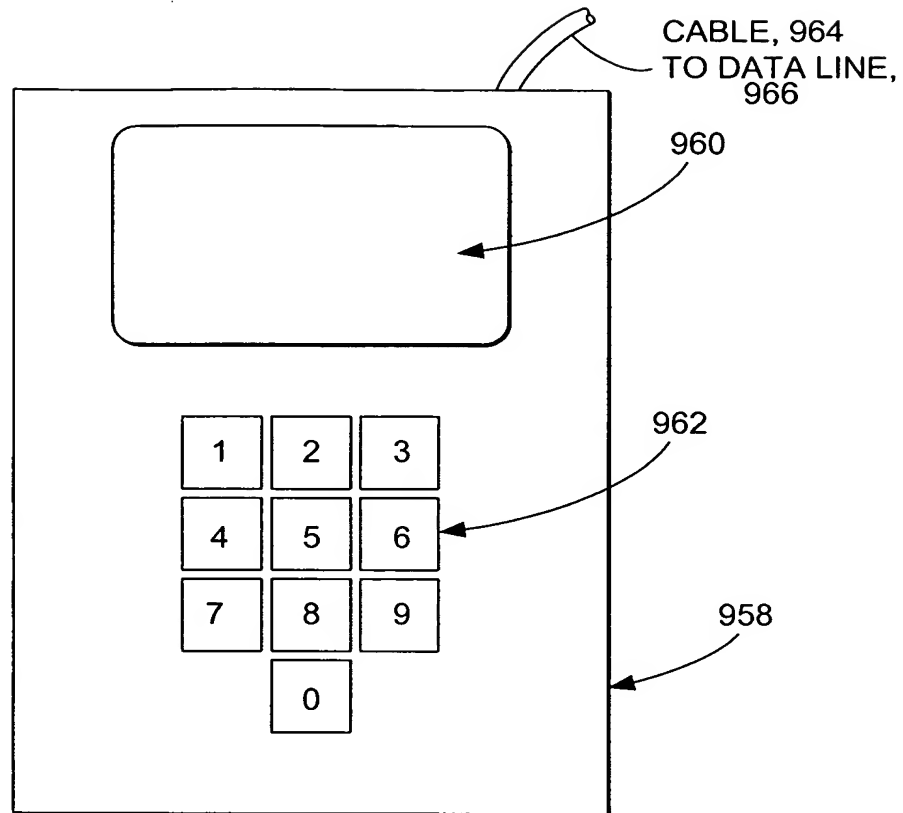


FIG. 22

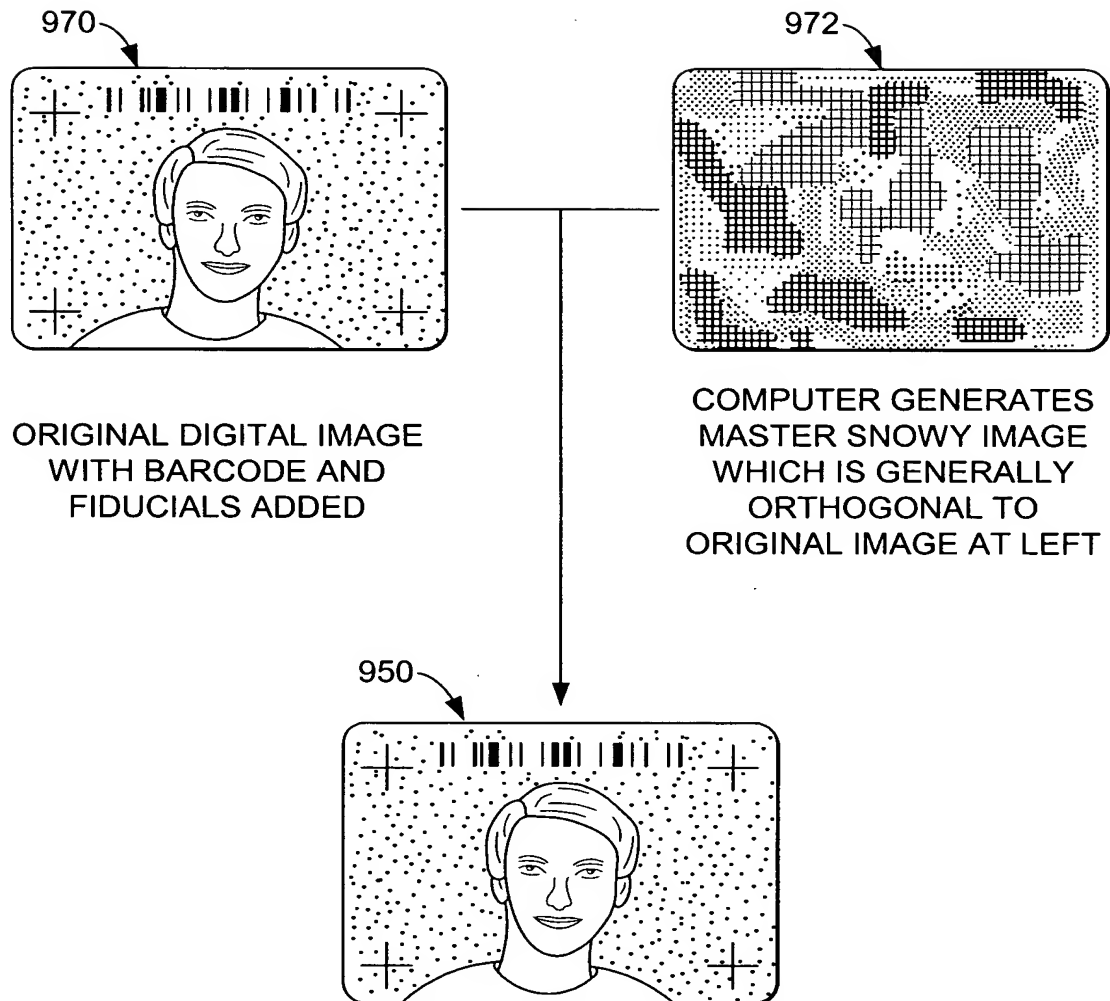




CONTAINS RUDIMENTARY OPTICAL SCANNER,  
MEMORY BUFFERS, COMMUNICATIONS DEVICES,  
AND MICROPROCESSOR

CONSUMER MERELY PLACES CARD INTO WINDOW  
AND CAN, AT THEIR PREARRANGED OPTION, EITHER  
TYPE IN A PERSONAL IDENTIFICATION NUMBER (PIN,  
FOR ADDED SECURITY) OR NOT. THE TRANSACTION  
IS APPROVED OR DISAPPROVED WITHIN SECONDS.

FIG. 23



COMBINED TO FORM PERSONAL CASH CARD

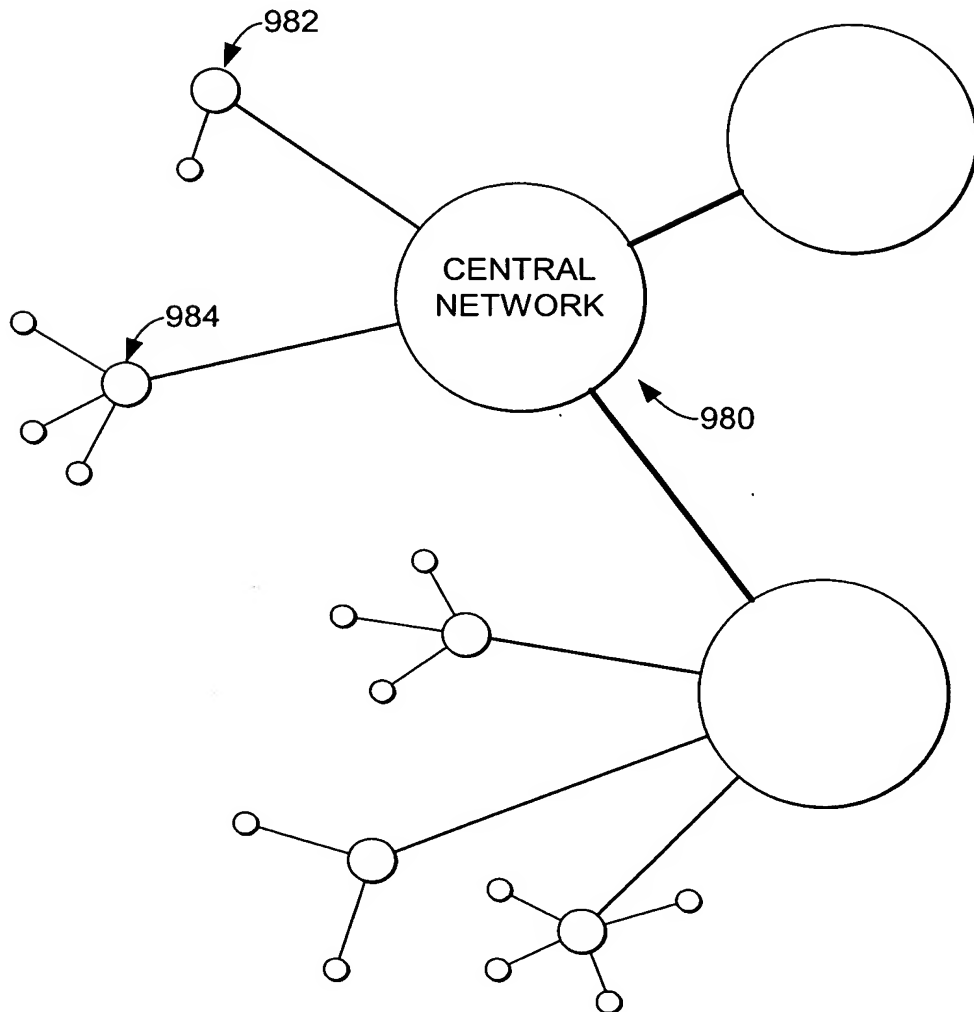
FIG. 24

## TYPICAL TRANSACTION STEPS

1. READER SCANS IMAGE ON CARD, STORES IN MEMORY, EXTRACTS PERSON'S ID
2. OPTIONAL: USER KEYS IN PIN NUMBER
  3. READER CALLS CENTRAL ACCOUNT DATA NETWORK, HANDSHAKES
  4. READER SENDS ID, (PIN), MERCHANT INFORMATION, AND REQUESTED TRANSACTION AMOUNT TO CENTRAL NETWORK
    5. CENTRAL NETWORK VERIFIES ID, PIN, MERCHANT INFO, AND ACCOUNT BALANCE
    6. IF OK, CENTRAL NETWORK GENERATES TWENTY-FOUR SETS OF SIXTEEN DISTINCT RANDOM NUMBERS, WHERE THE RANDOM NUMBERS ARE INDEXES TO A SET OF 64K ORTHOGONAL SPATIAL PATTERNS
7. CENTRAL NETWORK TRANSMITS FIRST OK, AND THE SETS OF RANDOM NUMBERS
8. READER STEPS THROUGH THE TWENTY-FOUR SETS
  - 8A. READER ADDS TOGETHER SET OF ORTHOGONAL PATTERNS
  - 8B. READER PERFORMS DOT PRODUCT OF RESULTANT PATTERN AND CARD SCAN, STORES RESULT
9. READER TRANSMITS THE TWENTY-FOUR DOT PRODUCT RESULTS TO CENTRAL NETWORK
  10. CENTRAL NETWORK CHECKS RESULTS AGAINST MASTER
  11. CENTRAL NETWORK SENDS FINAL APPROVAL OR DENIAL
  12. CENTRAL NETWORK DEBITS MERCHANT ACCOUNT, CREDITS CARD ACCOUNT

FIG. 25

## THE NEGLIGIBLE-FRAUD CASH CARD SYSTEM



A BASIC FOUNDATION OF THE CASH CARD SYSTEM IS A 24-HOUR INFORMATION NETWORK, WHERE BOTH THE STATIONS WHICH CREATE THE PPHYSICAL CASH CARDS, 950, AND THE POINT-OF-SALES, 984, ARE ALL HOOKED UP TO THE SAME NETWORK CONTINUOUSLY

FIG. 26

FIG. 27

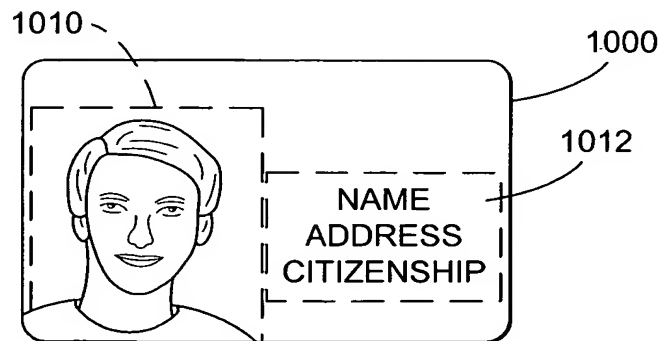
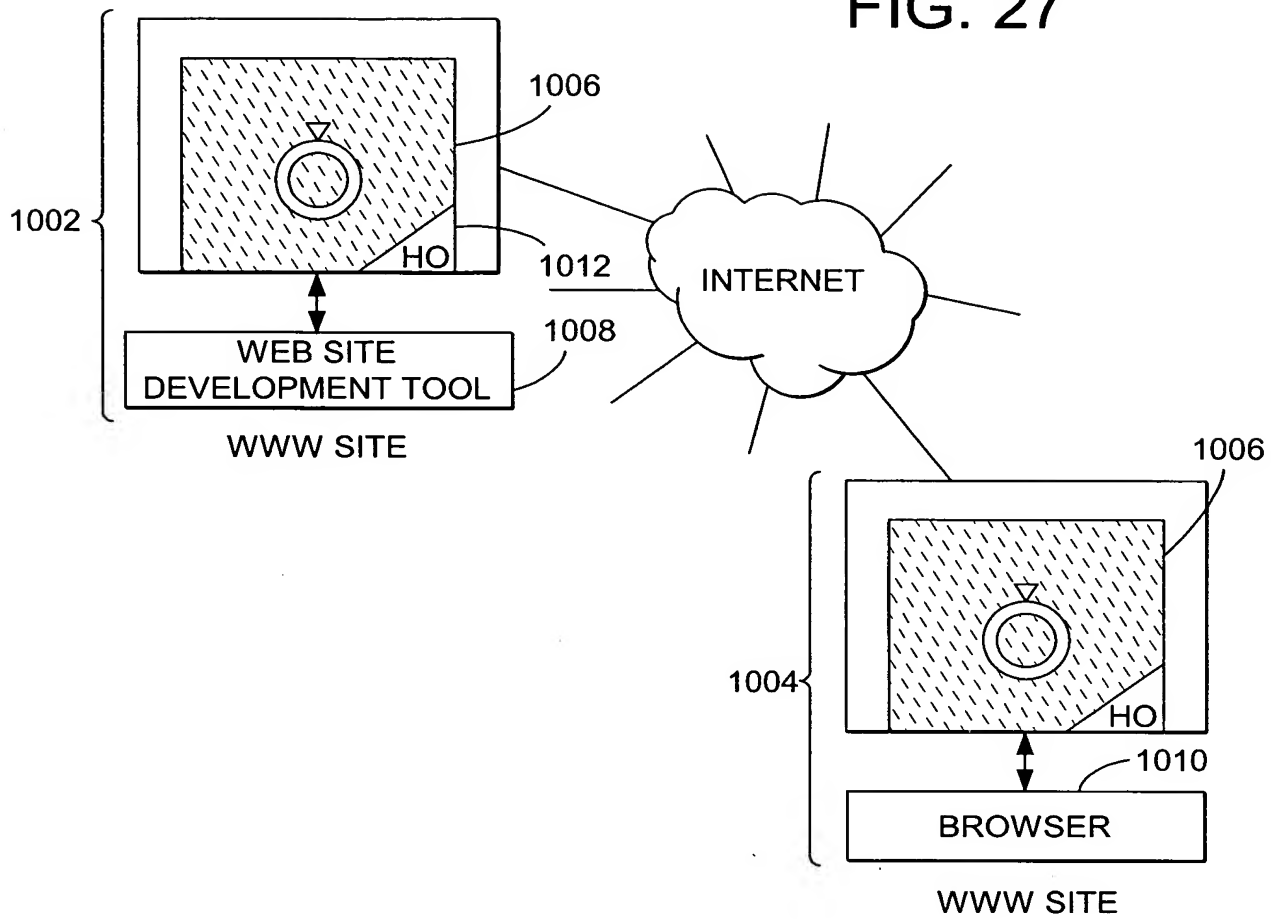


FIG. 28

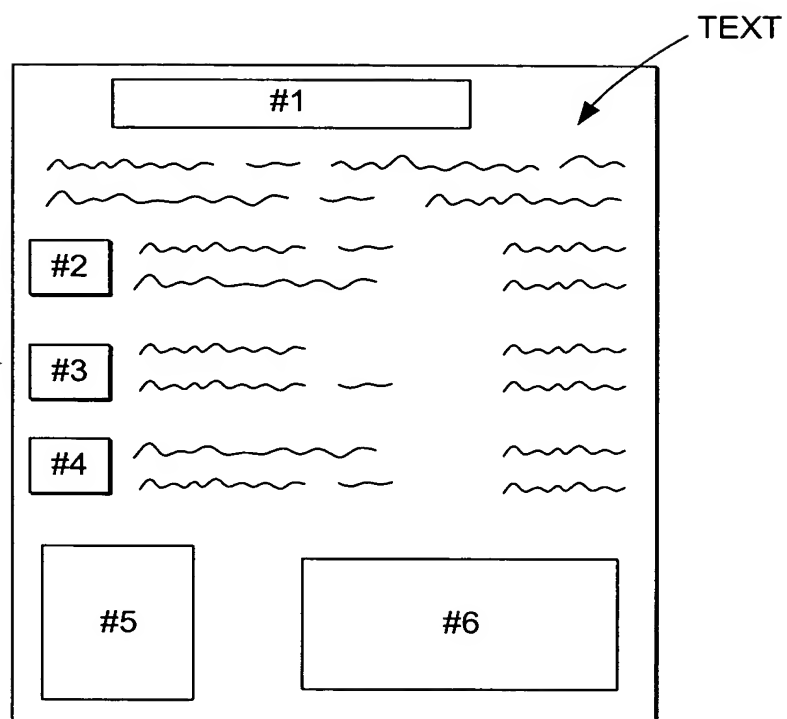


FIG. 27A

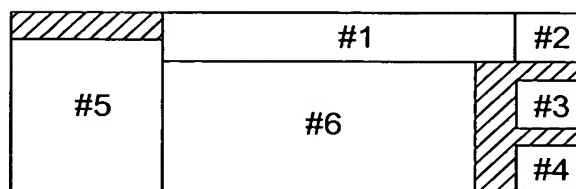


FIG. 27B

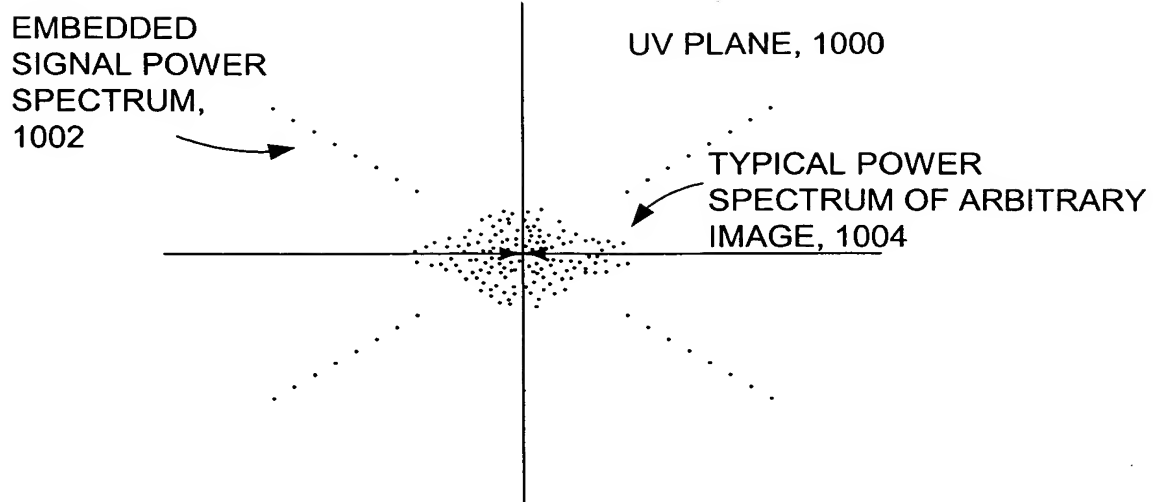


FIG. 29

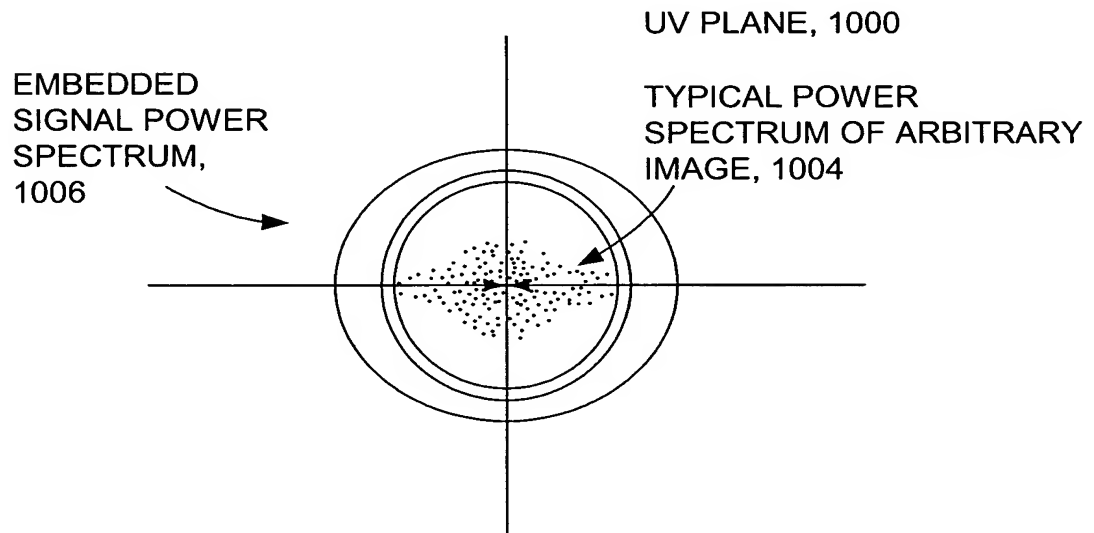


FIG. 30

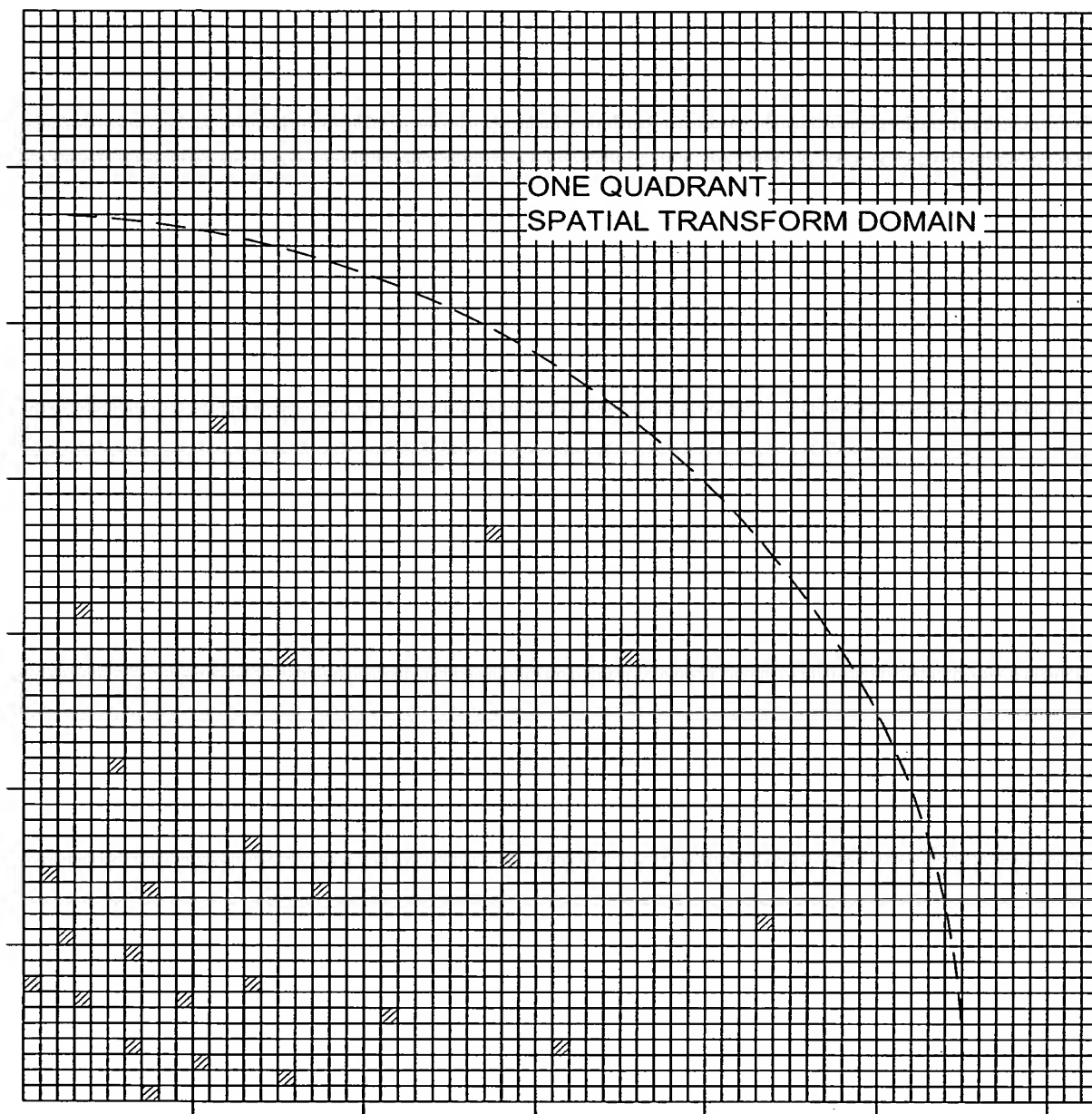
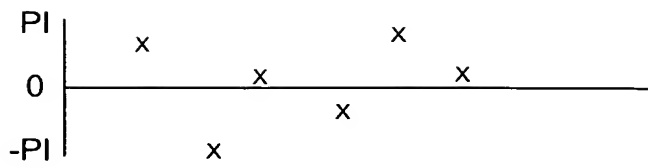


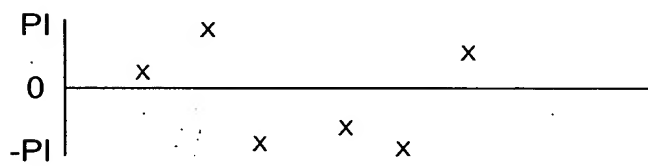
FIG. 29A





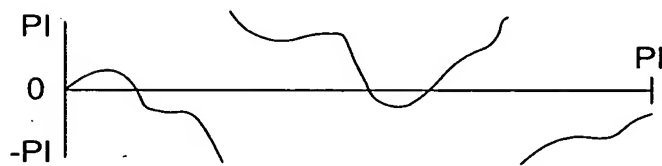
PHASE OF SPATIAL  
FREQUENCIES ALONG  
FORWARD 45 DEGREE  
AXES, 1008

FIG. 31A



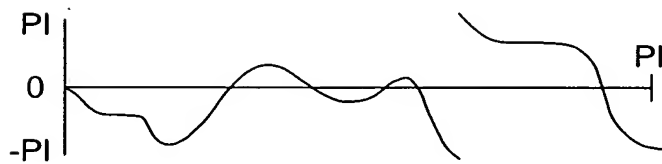
PHASE OF SPATIAL  
FREQUENCIES ALONG  
BACKWARD 45 DEGREE  
AXES, 1010

FIG. 31B



PHASE OF SPATIAL  
FREQUENCIES ALONG  
FIRST CONCENTRIC  
RING, 1012

FIG. 32A



PHASE OF SPATIAL  
FREQUENCIES ALONG  
SECOND CONCENTRIC  
RING, 1014

FIG. 32B



PHASE OF SPATIAL  
FREQUENCIES ALONG  
THIRD CONCENTRIC  
RING, 1016

FIG. 32C

FIG. 33A

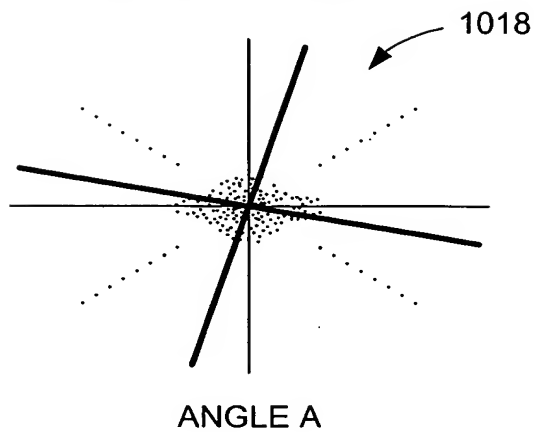


FIG. 33B

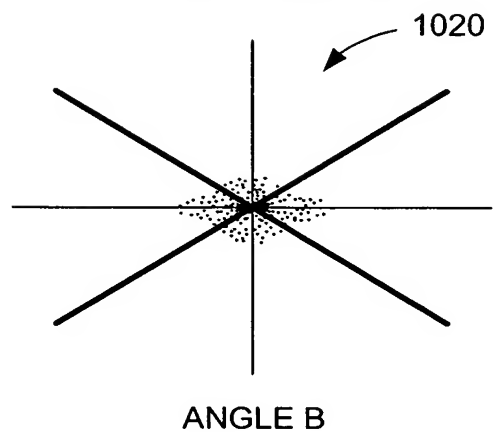
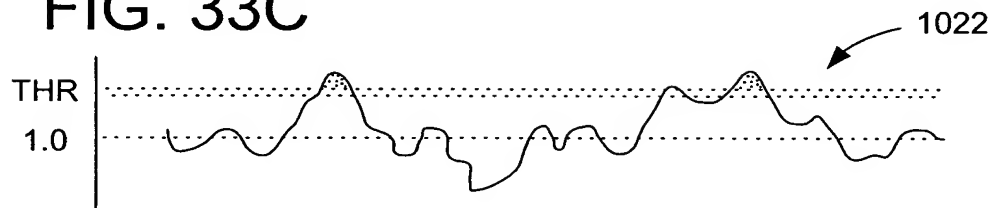
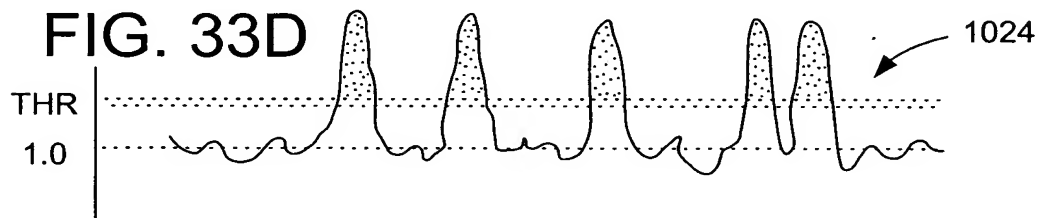


FIG. 33C



POWER PROFILE ALONG ANGLE A, AS NORMALIZED BY ITS OWN MOVING AVERAGE; ONLY A MINIMAL AMOUNT EXCEEDS THRESHOLD, GIVING A SMALL INTEGRATED VALUE

FIG. 33D



POWER PROFILE ALONG ANGLE B, AS NORMALIZED BY ITS OWN MOVING AVERAGE; THIS FINDS STRONG ENERGY ABOVE THE THRESHOLD

FIG. 33E

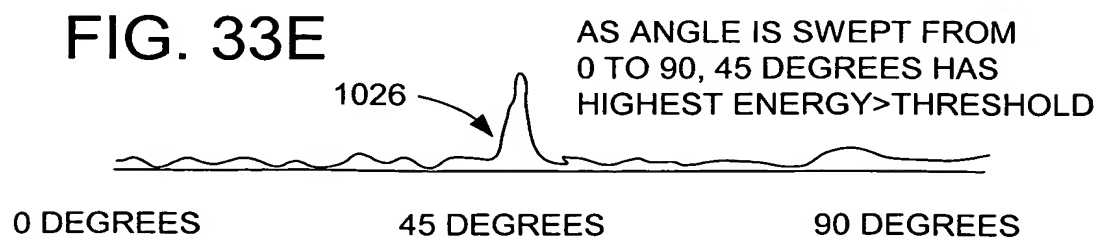


FIG. 34A

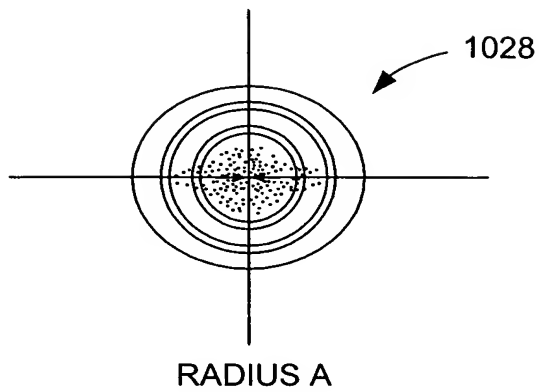


FIG. 34B

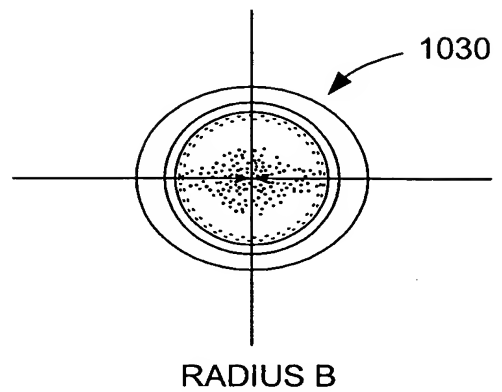


FIG. 34C

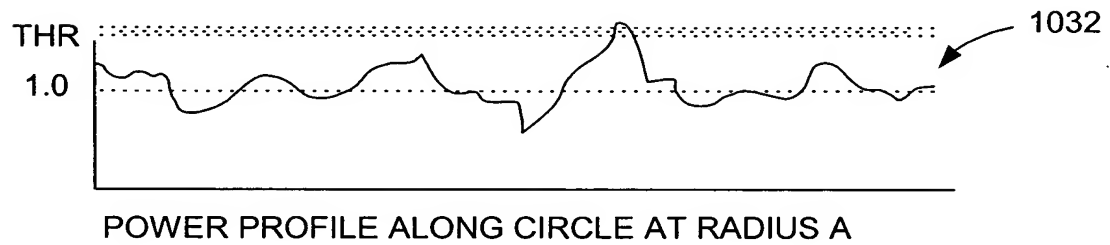


FIG. 34D

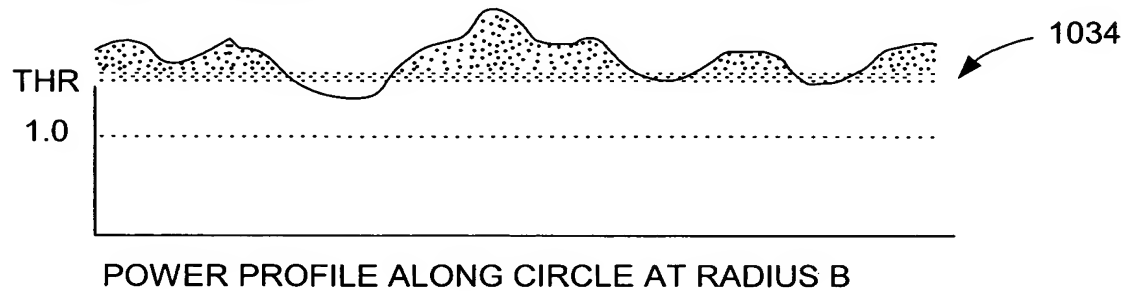


FIG. 34E

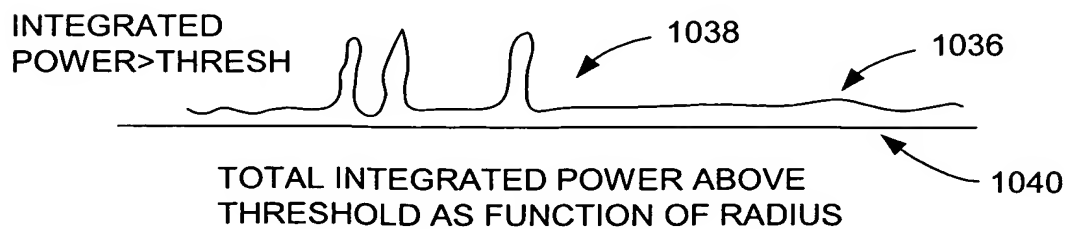
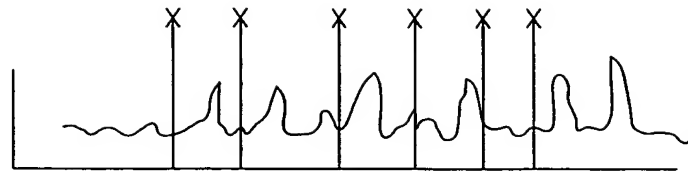
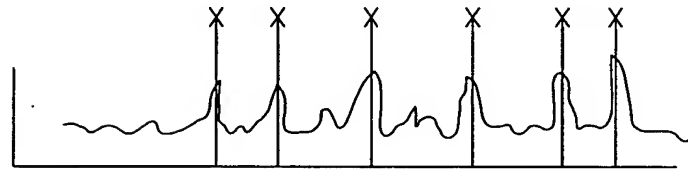


FIG. 35A



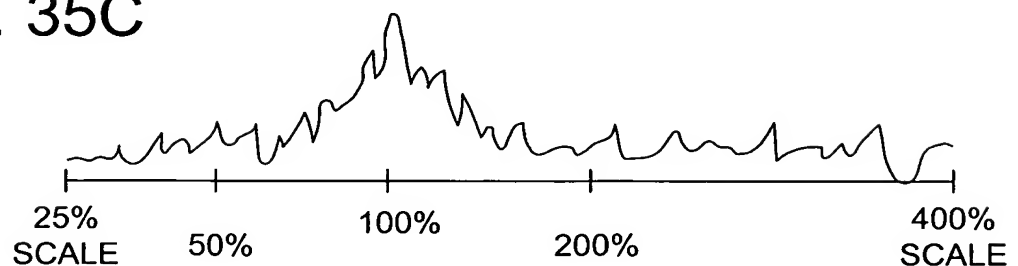
SCALE = A: ADD LL POWER VALUES AT  
THE "KNOWN" FREQUENCIES", 1042

FIG. 35B



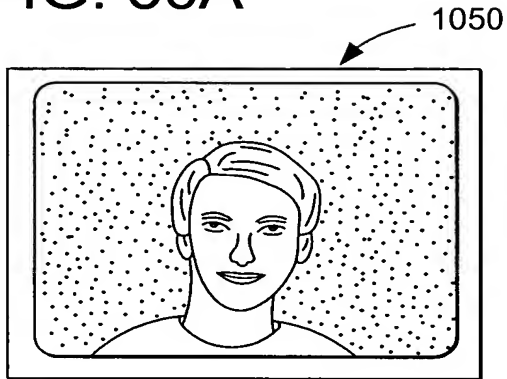
SCALE = B: ADD LL POWER VALUES AT  
THE "KNOWN" FREQUENCIES", 1044

FIG. 35C



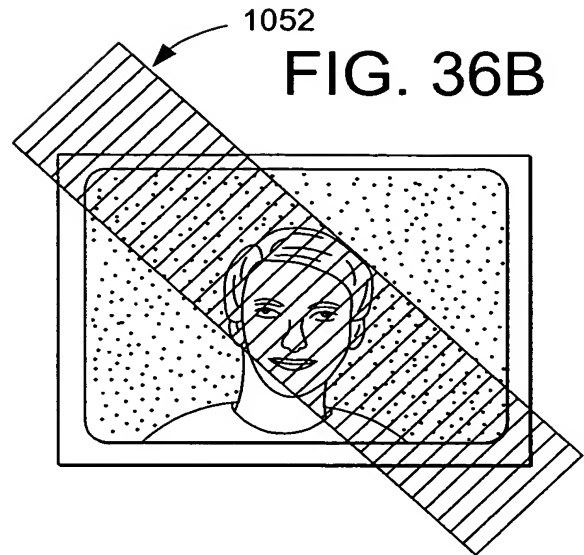
"SCALED-KERNEL" BASED MATCHED FILTER;  
PEAK IS WHERE THE SCALE OF THE SUBLIMINAL  
GRID WAS FOUND, 1046

FIG. 36A



ARBITRARY ORIGINAL IMAGE  
IN WHICH SUBLIMINAL GRATICULES  
MAY HAVE BEEN PLACED

FIG. 36B



"COLUMN SCAN" IS APPLIED  
ALONG A GIVEN ANGLE THROUGH  
THE CENTER OF THE IMAGE

FIG. 36C

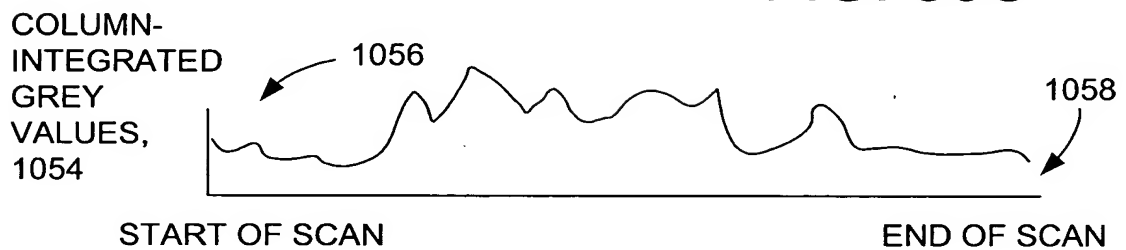
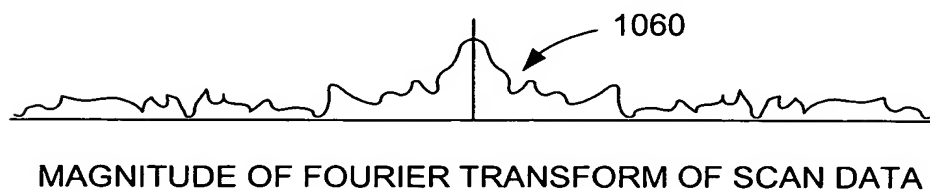


FIG. 36D



MAGNITUDE OF FOURIER TRANSFORM OF SCAN DATA

## PROCESS STEPS

1. SCAN IN PHOTOGRAPH
2. 2D FFT
3. GENERATE 2D POWER SPECTRUM, FILTER WITH E.G. 3X3 BLURRING KERNEL
4. STEP ANGLES FROM 0 DEGREES THROUGH 90 (1/2 DEG)
5. GENERATE NORMALIZED VECTOR, WITH POWER VALUE AS NUMERATOR, AND MOVING AVERAGED POWER VALUE AS DENOMINATOR
6. INTEGRATE VALUES AS SOME THRESHOLD, GIVING A SINGLE INTEGRATED VALUE FOR THIS ANGLE
7. END STEP ON ANGLES
8. FIND TOP ONE OR TWO OR THREE "PEAKS" FROM THE ANGLES IN LOOP 4, THEN FOR EACH PEAK...
9. STEP SCALE FROM 25% TO 400%, STEP ~ 1.01
10. ADD THE NORMALIZED POWER VALUES CORRESPONDING TO THE 'N' SCALED FREQUENCIES OF STANDARD
11. KEEP TRACK OF HIGHEST VALUE IN LOOP
12. END LOOP 9 AND 8, DETERMINE HIGHEST VALUE
13. ROTATION AND SCALE NOW FOUND
14. PERFORM TRADITIONAL MATCHED FILTER TO FIND EXACT SPATIAL OFFSET
15. PERFORM ANY "FINE TUNNING" TO PRECISELY DETERMINE ROTATION, SCALE, OFFSET

FIG. 37

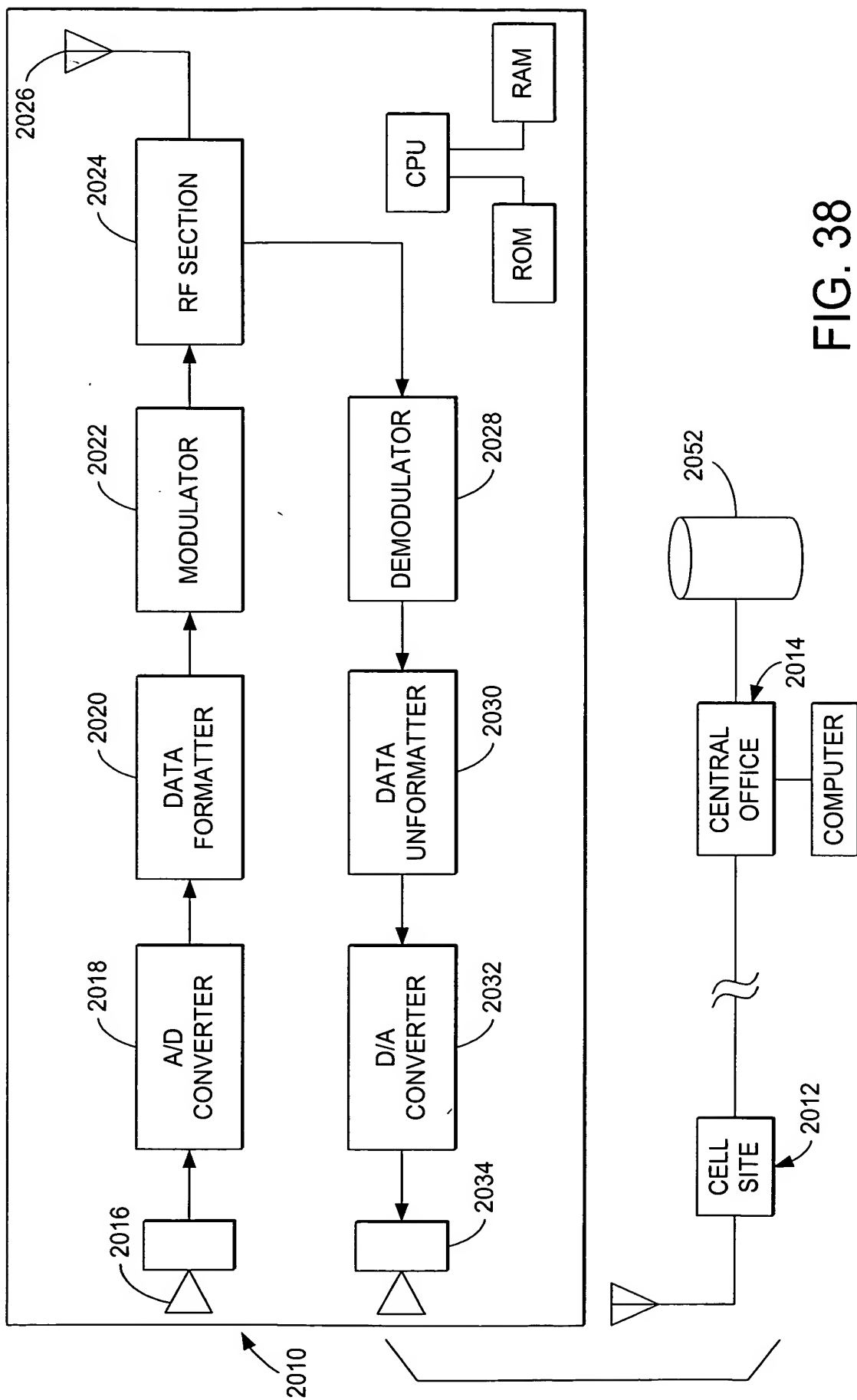


FIG. 38

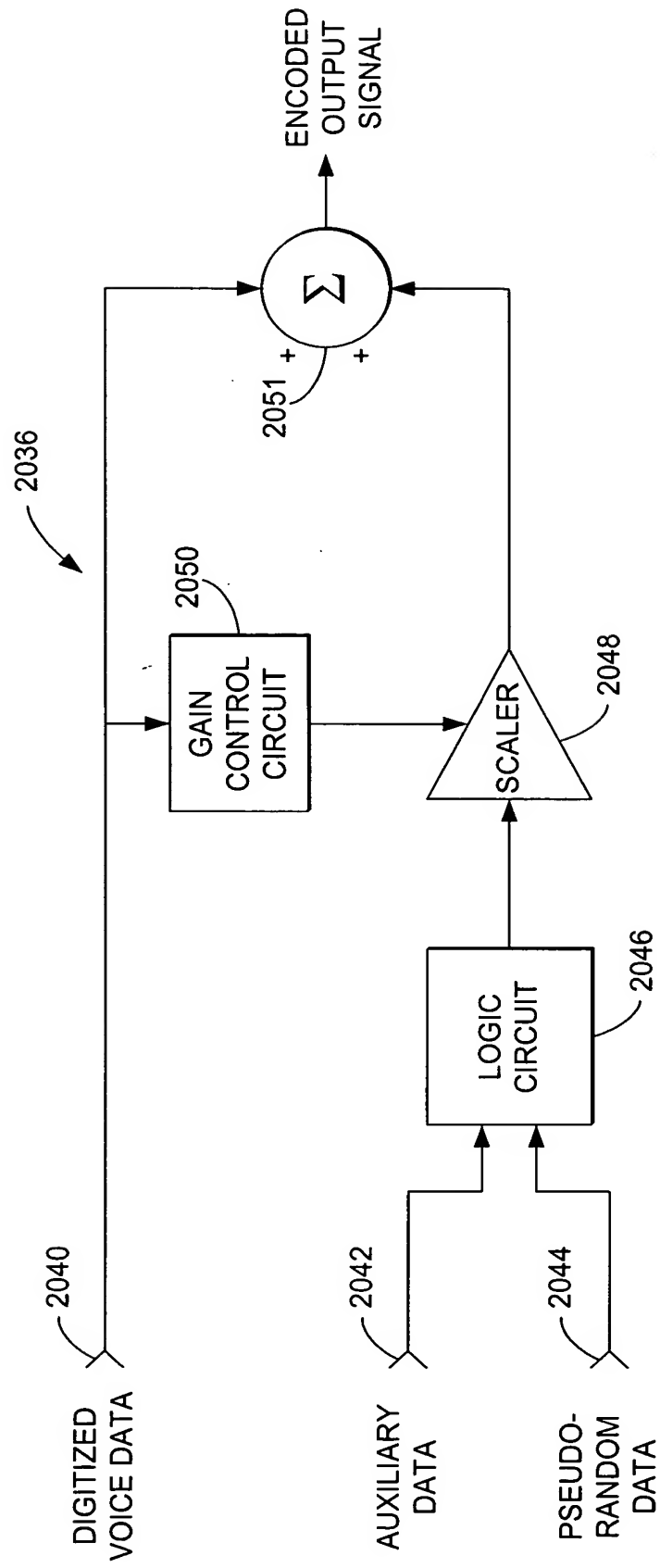


FIG. 39



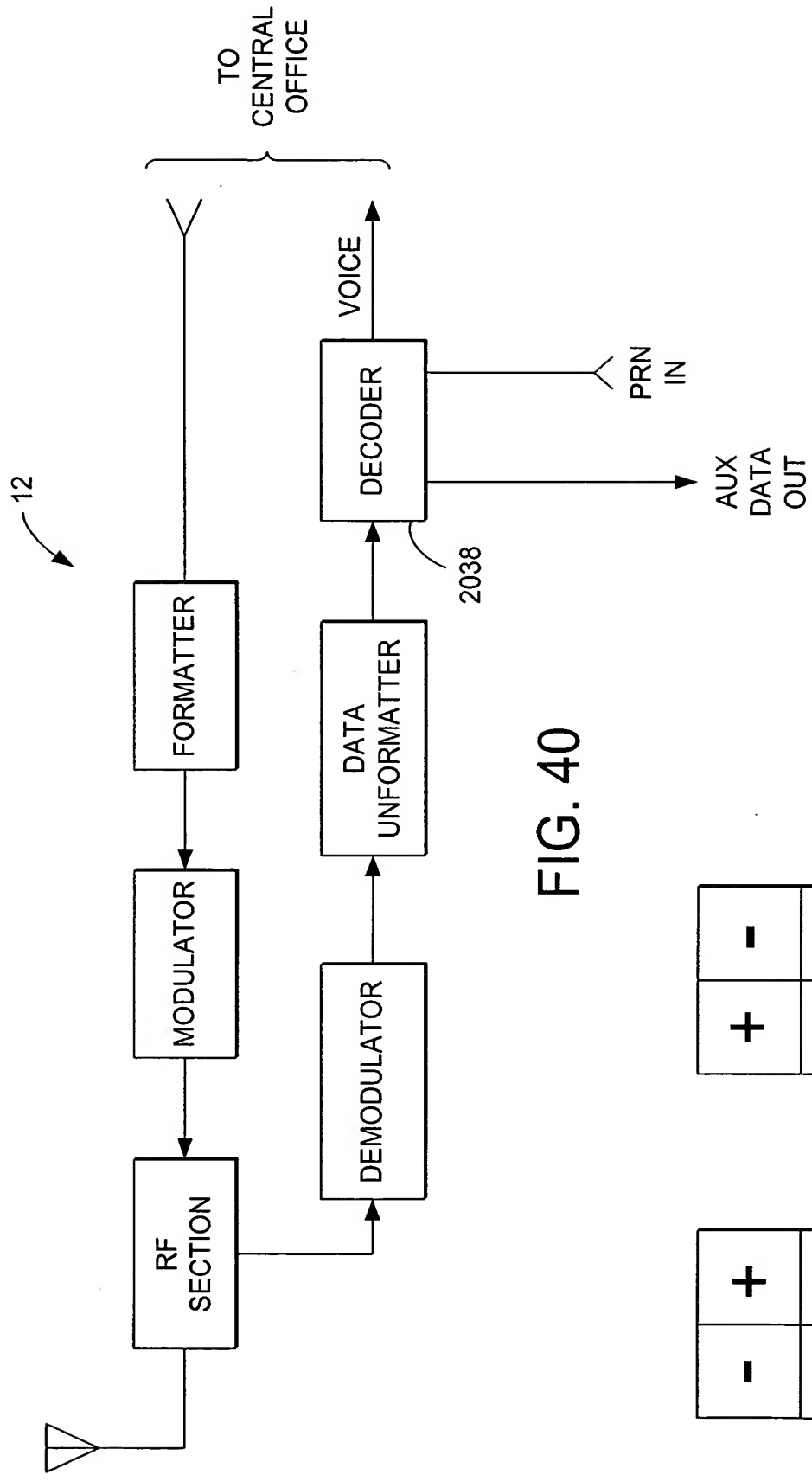


FIG. 40

-	+
+	-

FIG. 41A

+	-
-	+

FIG. 41B

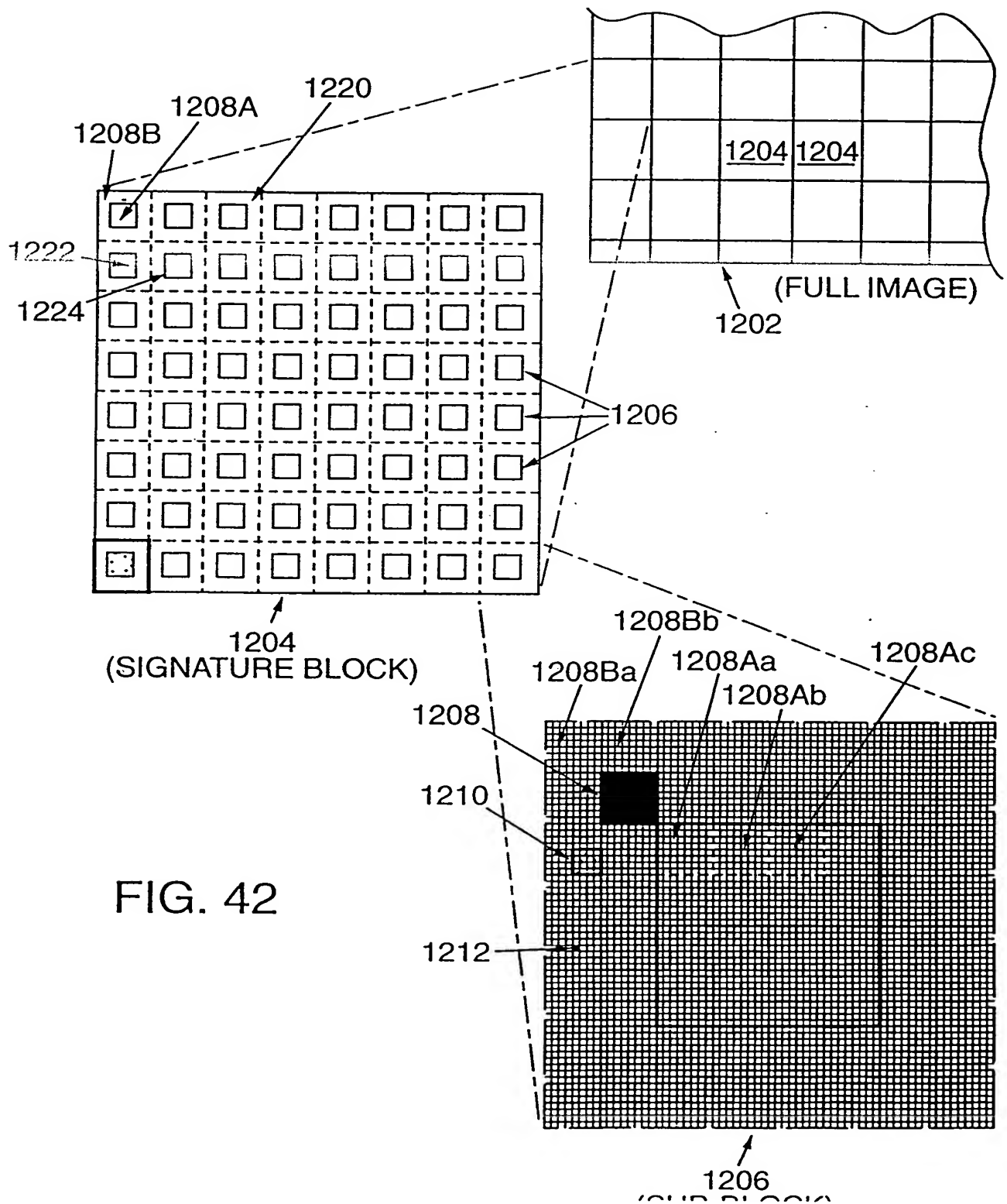
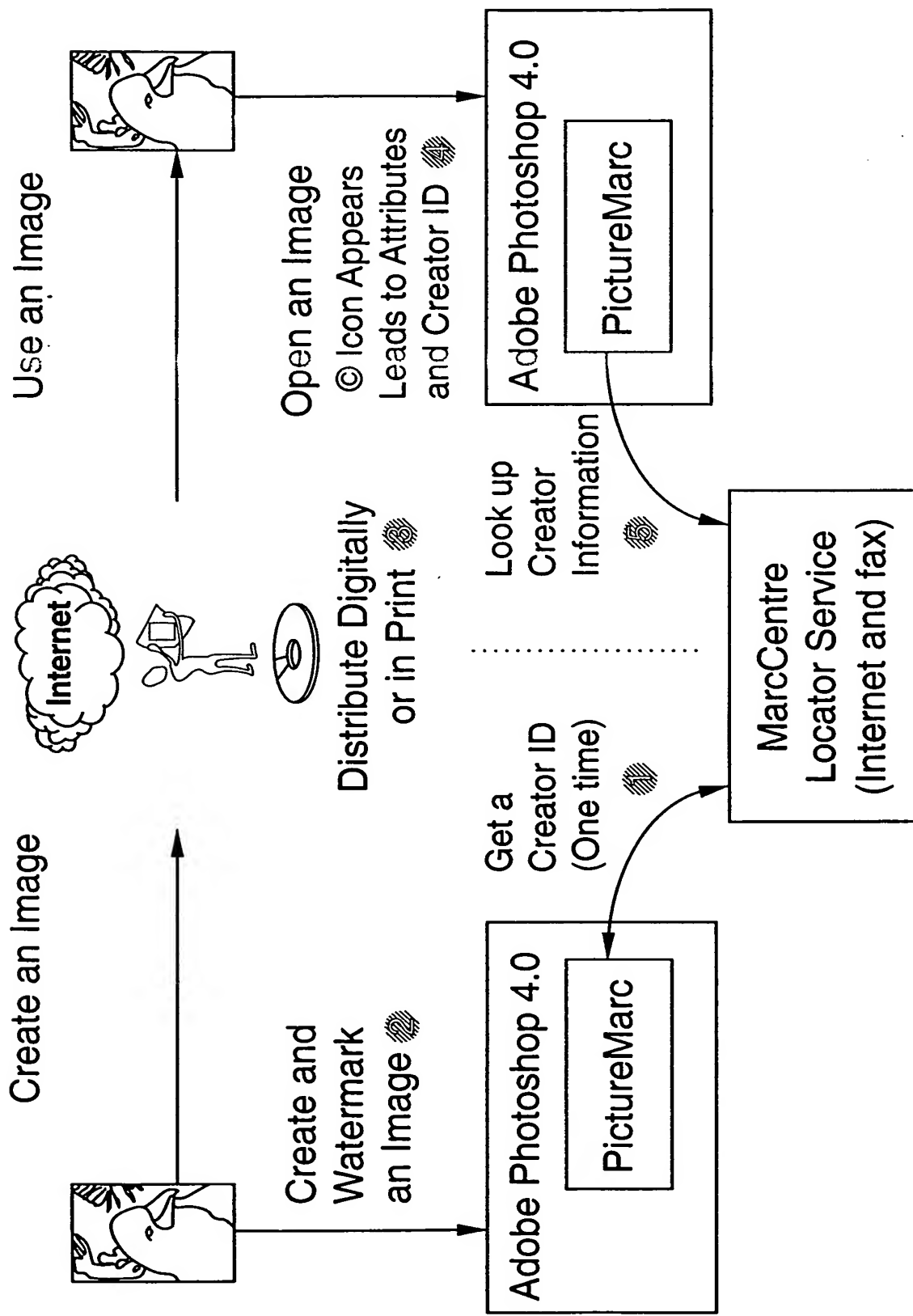
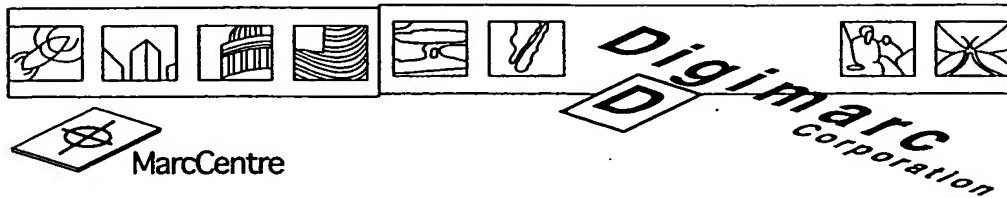


FIG. 43





## Welcome to MarcCentre Digimarc's Locator Service

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Offer

MarcCentre is an on-line service which links your up-to-date contact information to every image you watermark. You provide the details you want consumers of your image to see. Each time someone reads one of your watermarked images, they can access this information about you and your work with a single mouse click.

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FIG. 44

To find out more about how MarcCentre works and how you can get started taking advantage of this locator service, browse the MarcCentre overview page.

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For the technically minded, find out what's going on behind the scenes.

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Thank you for signing up with MarcCentre. There are two parts to the application form (1) your contact information and (2) Agencies or Representative contact information. Simply fill in the blanks on this page and click "Part 1 Complete" below.

<b>Name (First/Last)</b>	<input type="text"/>	<input type="text"/>
<b>Company</b>	<input type="text"/>	
<b>Address</b>	<input type="text"/>	
<b>City</b>	<input type="text"/>	<input type="text"/>
<b>State/Province</b>	<input type="text"/>	<input type="text"/>
<b>Zip/Postal Code</b>	<input type="text"/>	<input type="text"/>
<b>Country</b>	<input type="text"/>	
<b>Phone Number</b>	<input type="text"/>	<input type="text"/>
<b>Fax Number</b>	<input type="text"/>	<input type="text"/>
<b>Email Address</b>	<input type="text"/>	
<b>Your Home Page</b>	<input type="text" value="http://"/>	

FIG. 45

You can control how much of your contact information is displayed when a potential customer finds your profile on MarcCentre. Use the selections below to tell us what you want people to see.

<b>Phone Number</b>	<b>Mailing Address</b>	<b>Email Account</b>
<input checked="" type="radio"/> Show	<input checked="" type="radio"/> Show	<input checked="" type="radio"/> Show
<input type="radio"/> Don't show	<input type="radio"/> Don't show	<input type="radio"/> Don't show

Yes, I want to be on your mailing lists ☒

Please select your profession (one only).

☒ Photographer  
☐ Illustrator  
☐ Other

In order to communicate your primary area of focus or specialty to potential customers, please select one of the options from the list below -or- type in your own in the space next to "Custom Specialty"

<b>Photographer</b>	<b>Illustrator</b>
<input type="text" value="(none)"/>	<input type="text" value="(none)"/>

**Custom Specialty**

Digimarc displays an Image of the Day showcase on our web site. Would you like to participate?

- ☒ Yes.  
☐ Not at this time.

For security purposes, you will need to setup a password that allows you to edit your profile information. This password along with your creator ID are required before you can update your contact information.

**Password Re-enter to verify**

--	--

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For security reasons, the following credit card information is captured using secured sockets technology.

**Credit Card**

- ☒ Visa  
☐ MasterCard  
☐ American Express

**Card Number**

--

**Name Shown on Card**

--

**Expiration  
(MM/YY)**

--

When you are satisfied with your entries on this form press the "Part 1 Complete" button and continue with the second part of the subscription sign-up. If you wish to cancel, press the Back button on your browser.

Part 1 Complete

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FIG. 46

FIG. 47

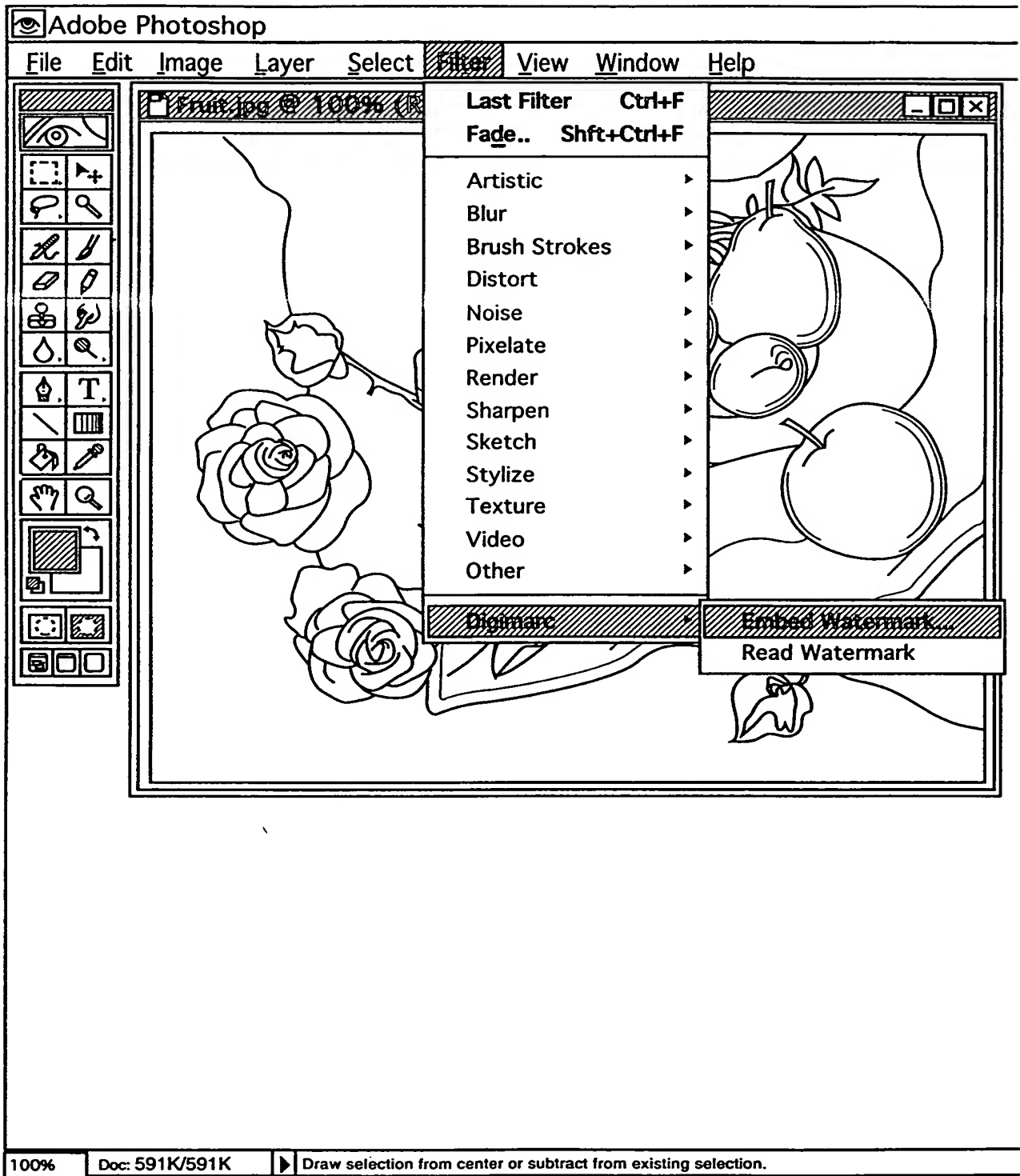


FIG. 48

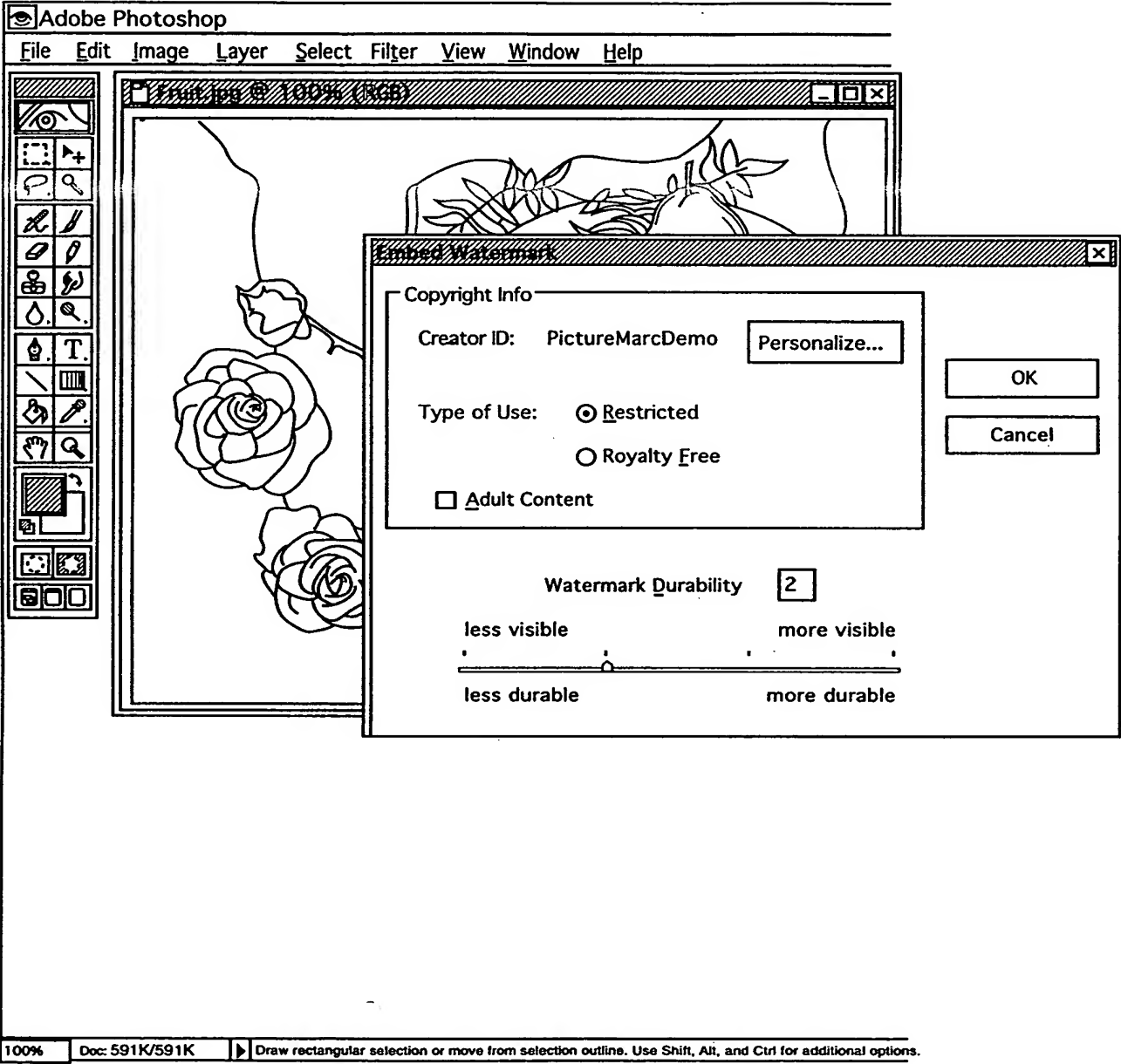




FIG. 49

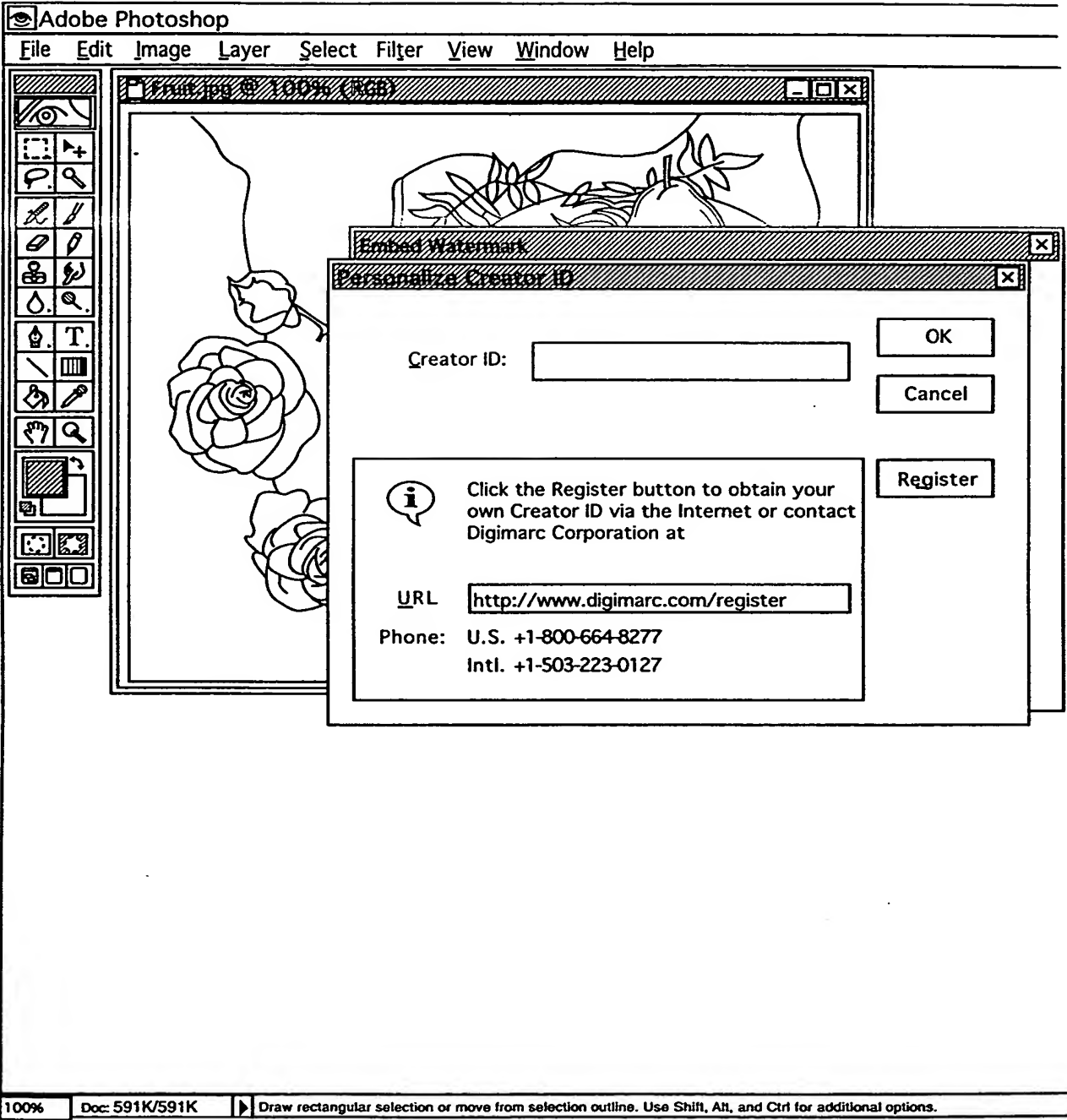


FIG. 50

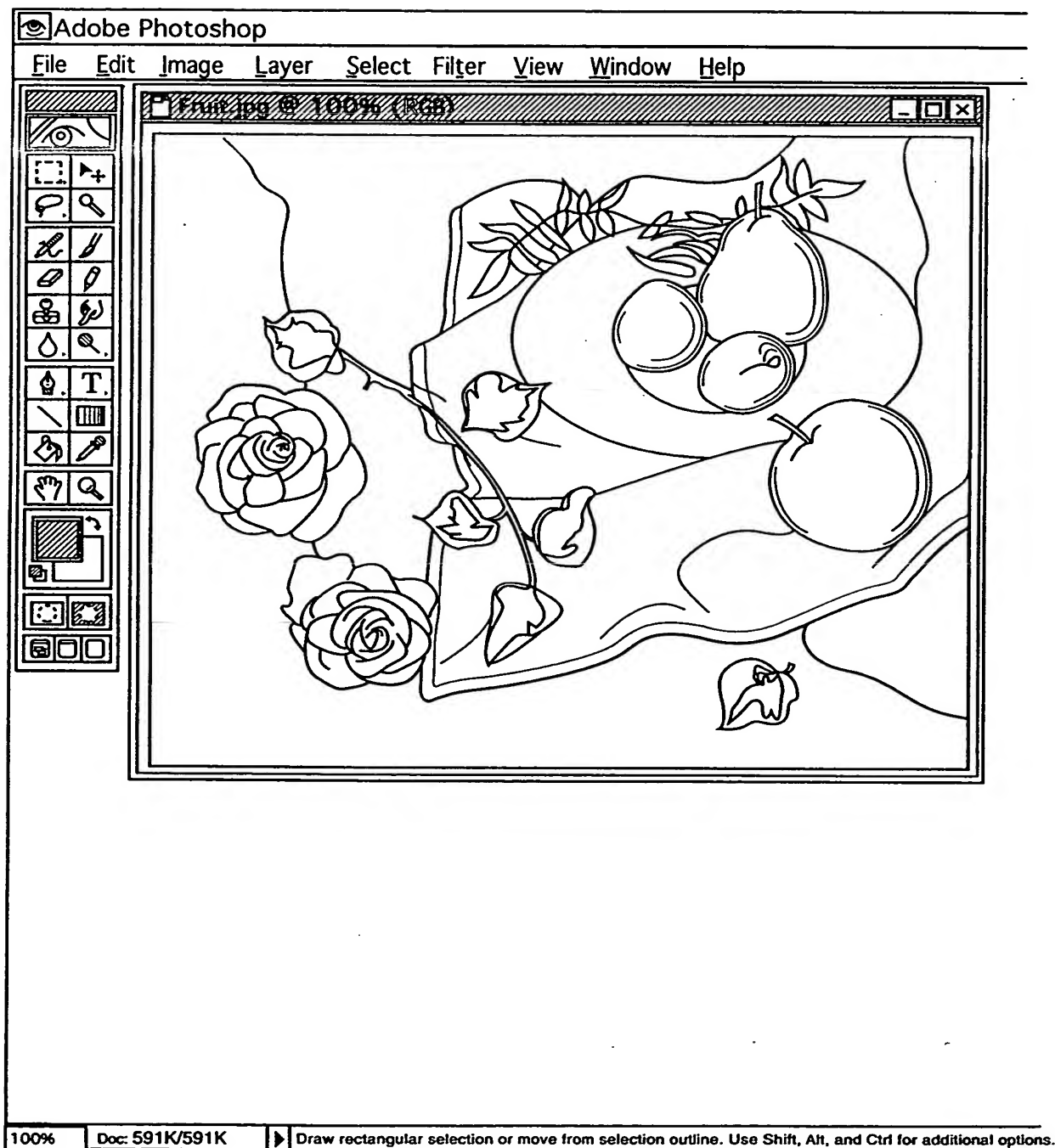


FIG. 51

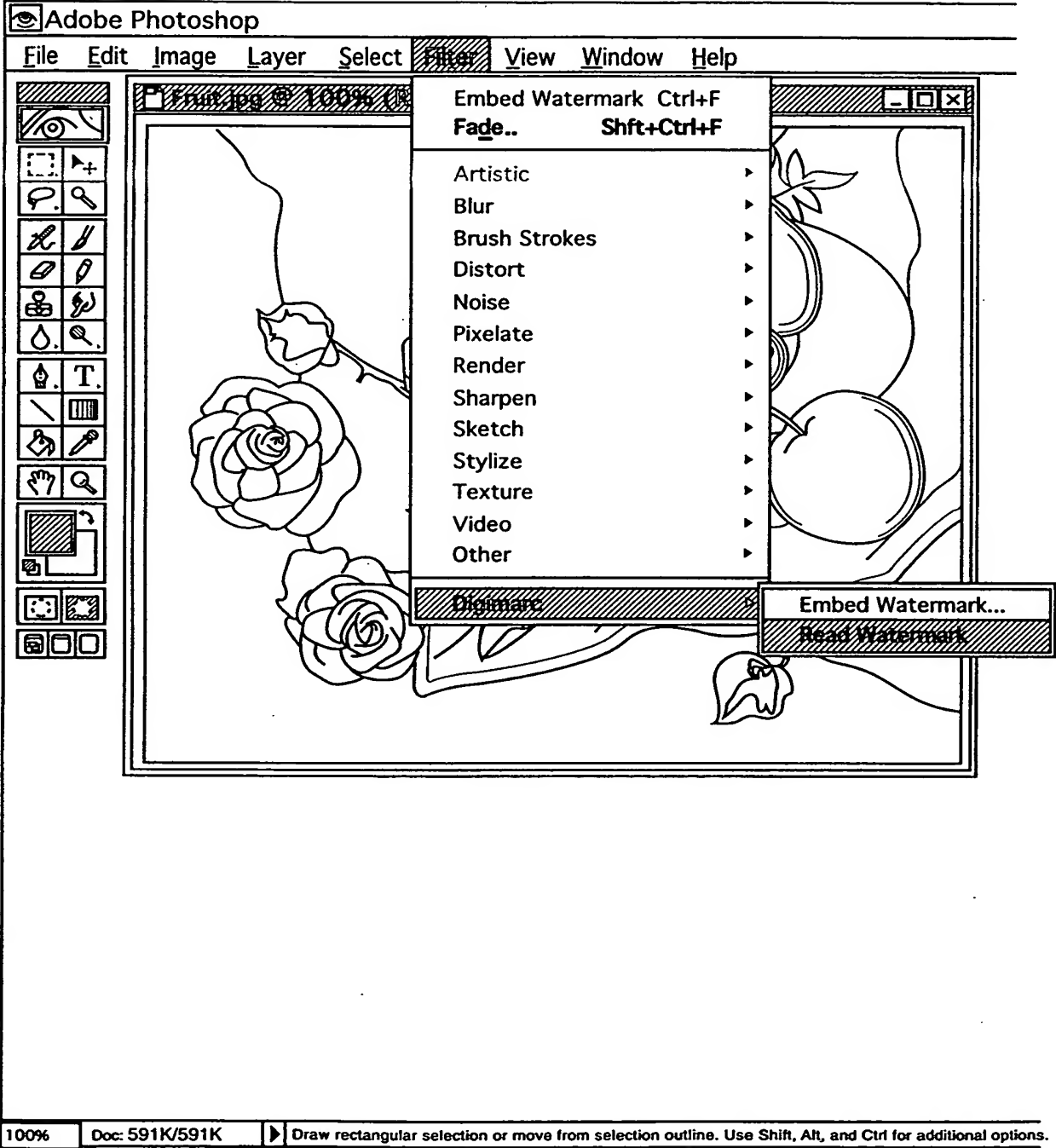


FIG. 52

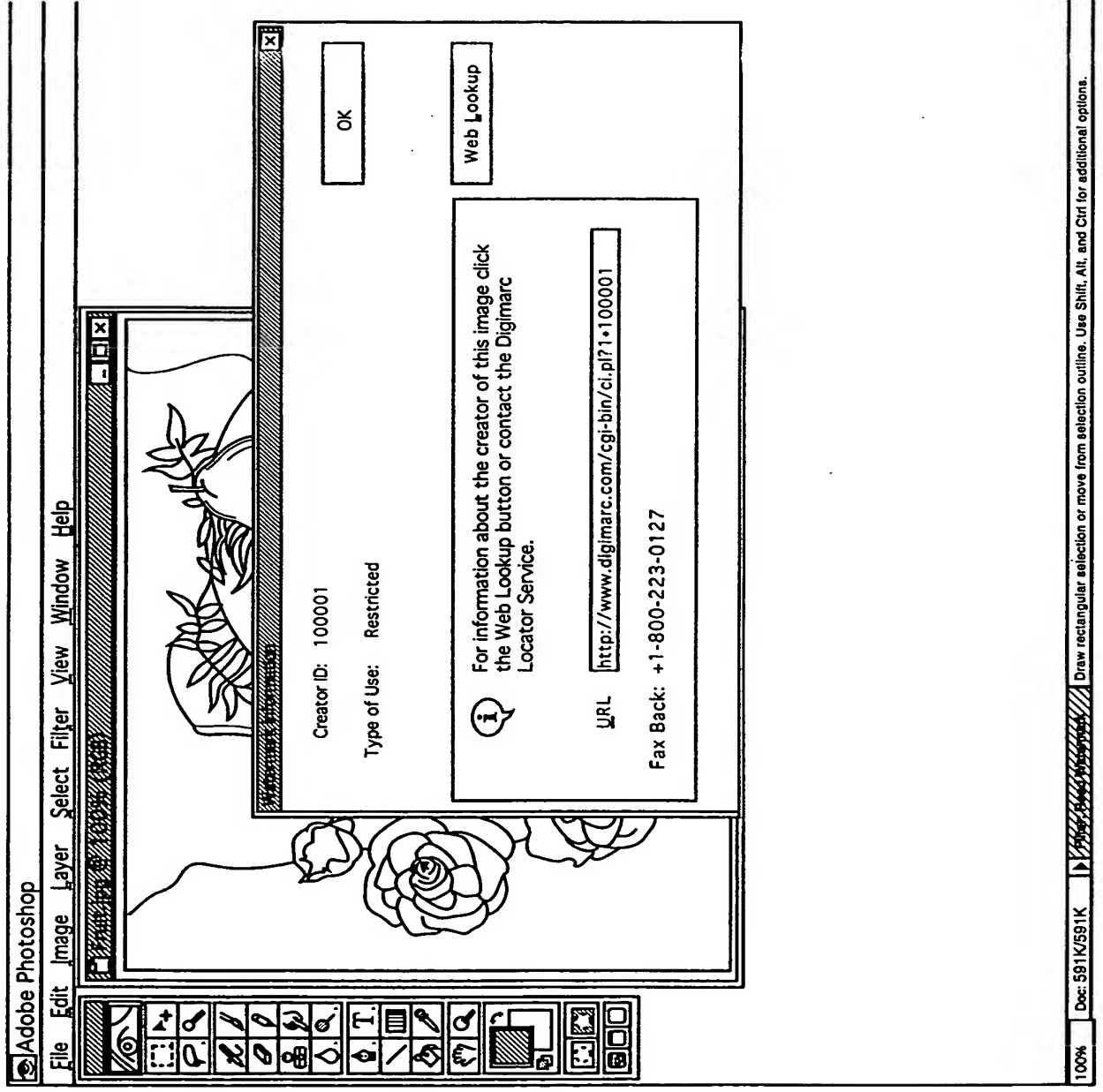
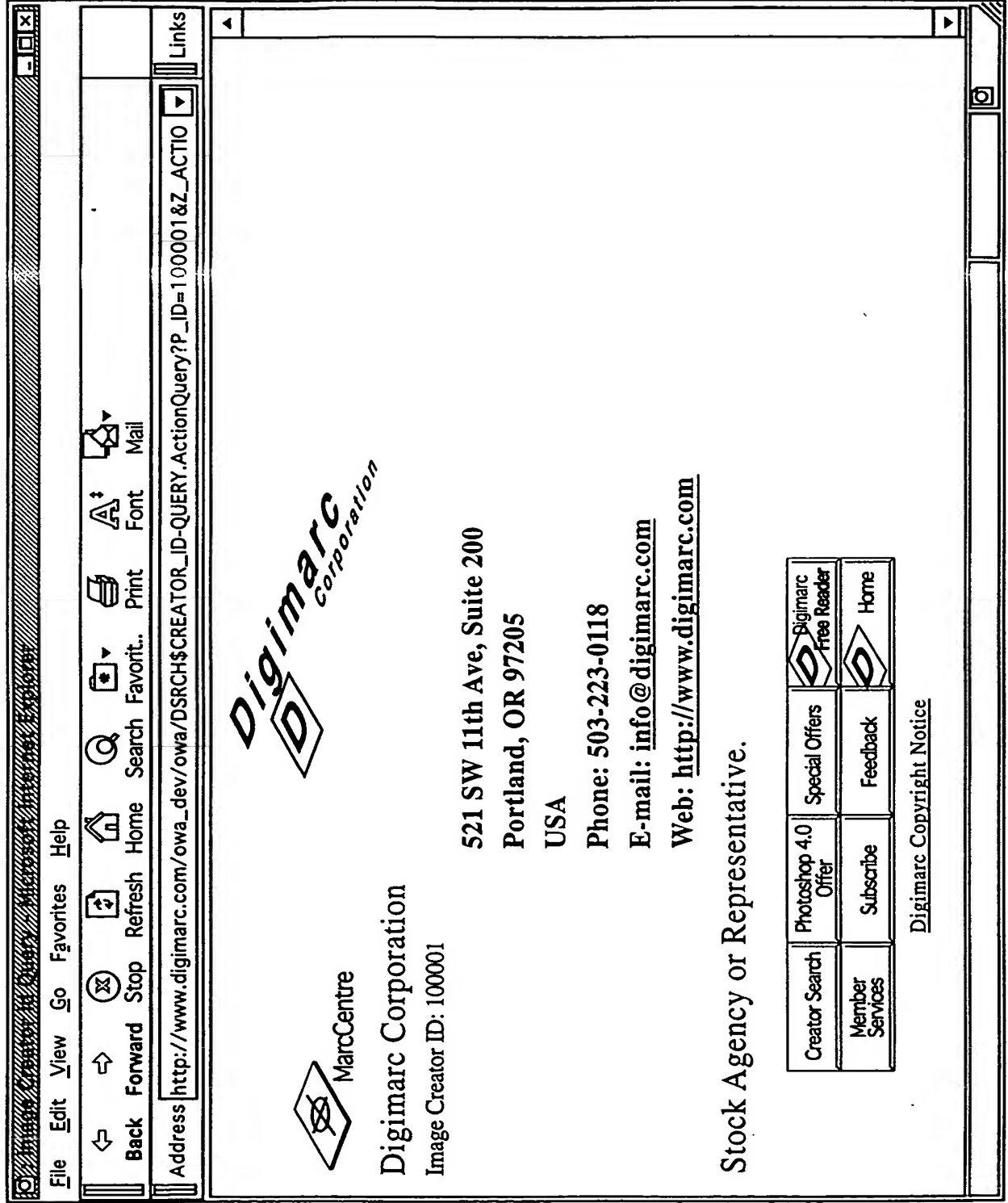


FIG. 53







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Enter the Image Creator ID in the box below and press "Submit Search". If it is a valid ID, the contact information details will be listed.

**Image Creator ID:**

If you want to search for specific image creators by a variety of criteria such as last name, specialty, city and/or state then press the "General Search" button below.

<a href="#">Creator Search</a>	<a href="#">Photoshop 4.0 Offer</a>	<a href="#">Special Offers</a>	 <a href="#">Digimarc Free Reader</a>
<a href="#">Member Services</a>	<a href="#">Subscribe</a>	<a href="#">Feedback</a>	 <a href="#">Home</a>

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FIG. 54

FIG. 55

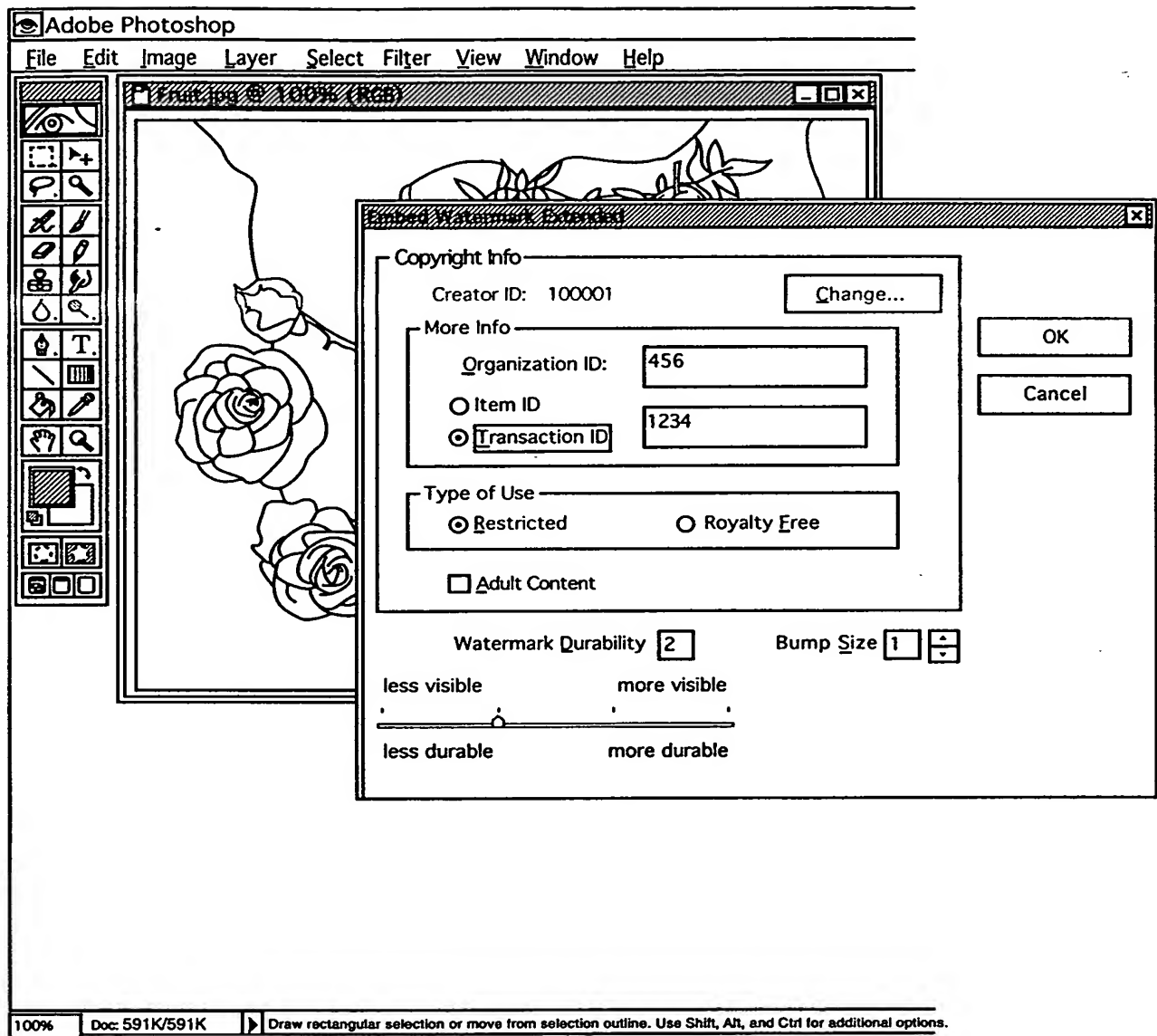


FIG. 56

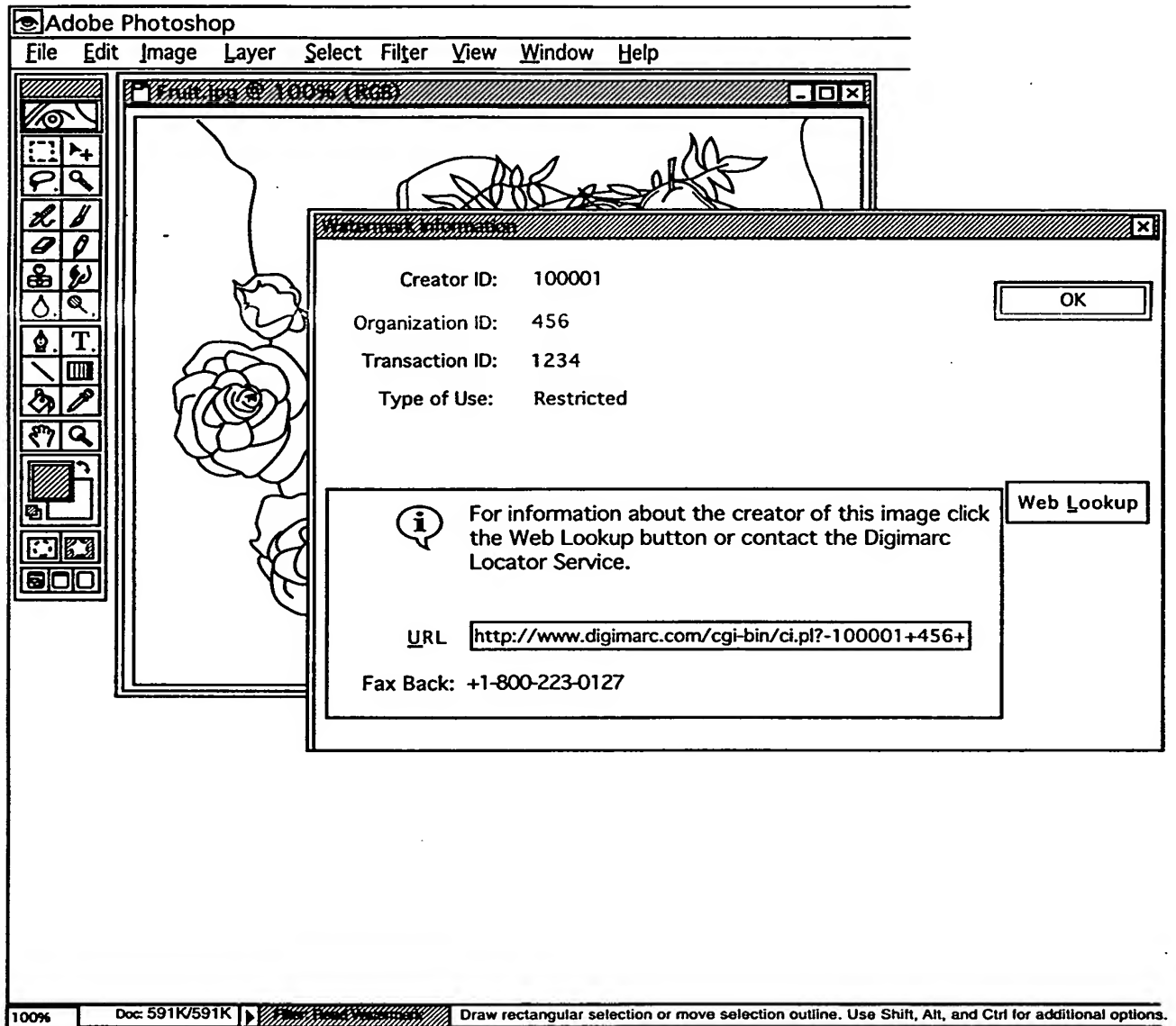




FIG. 57

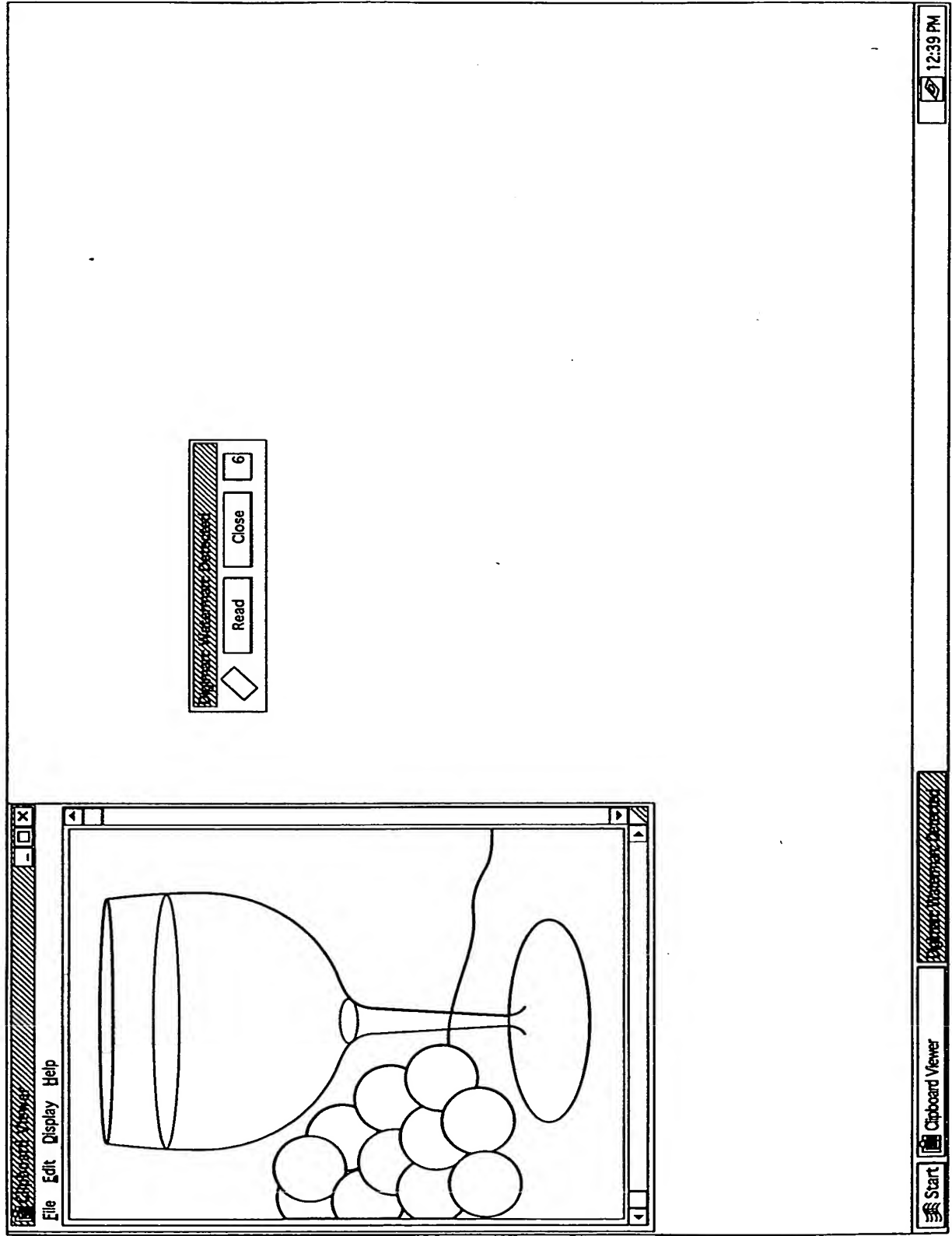


FIG. 58

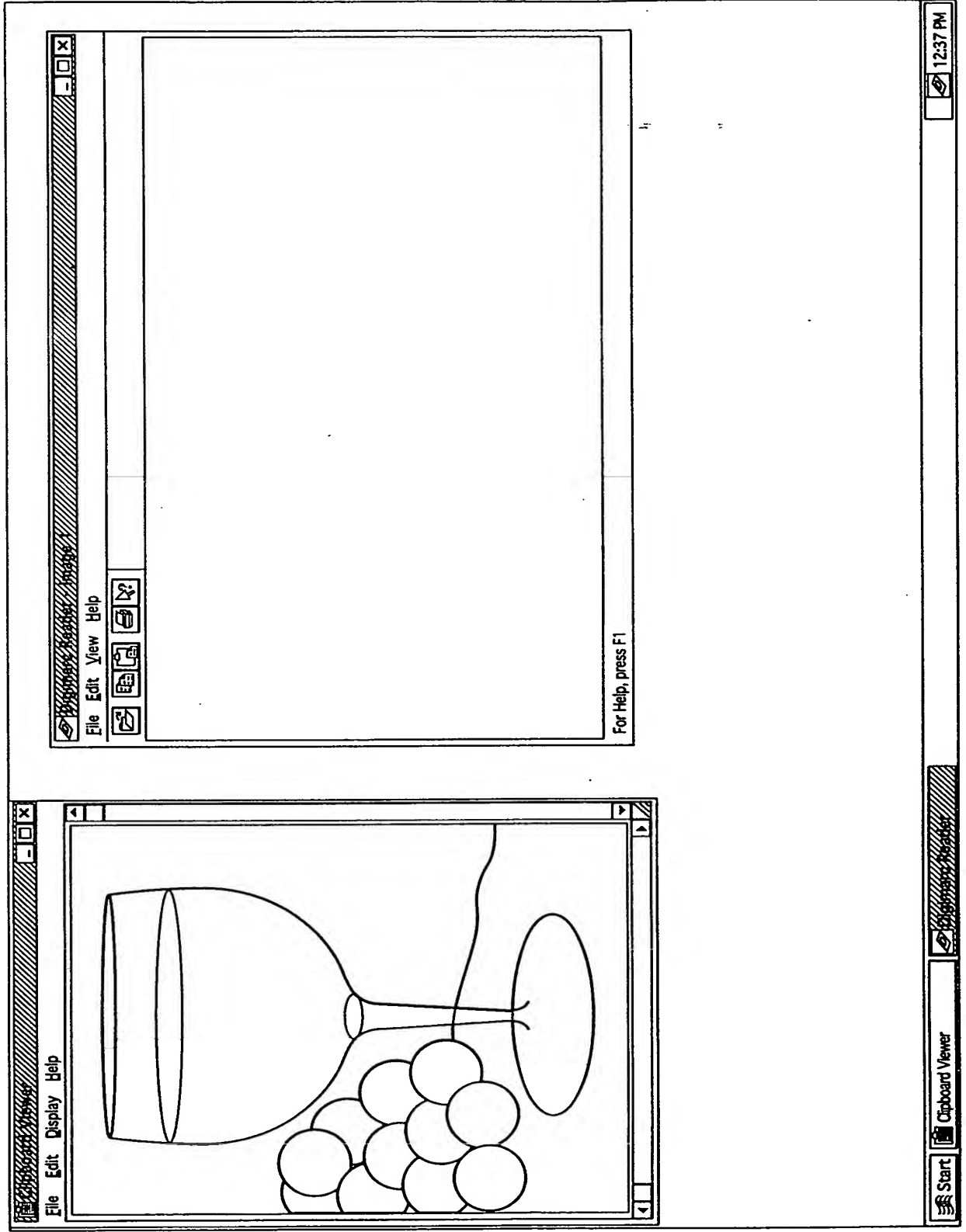


FIG. 59

